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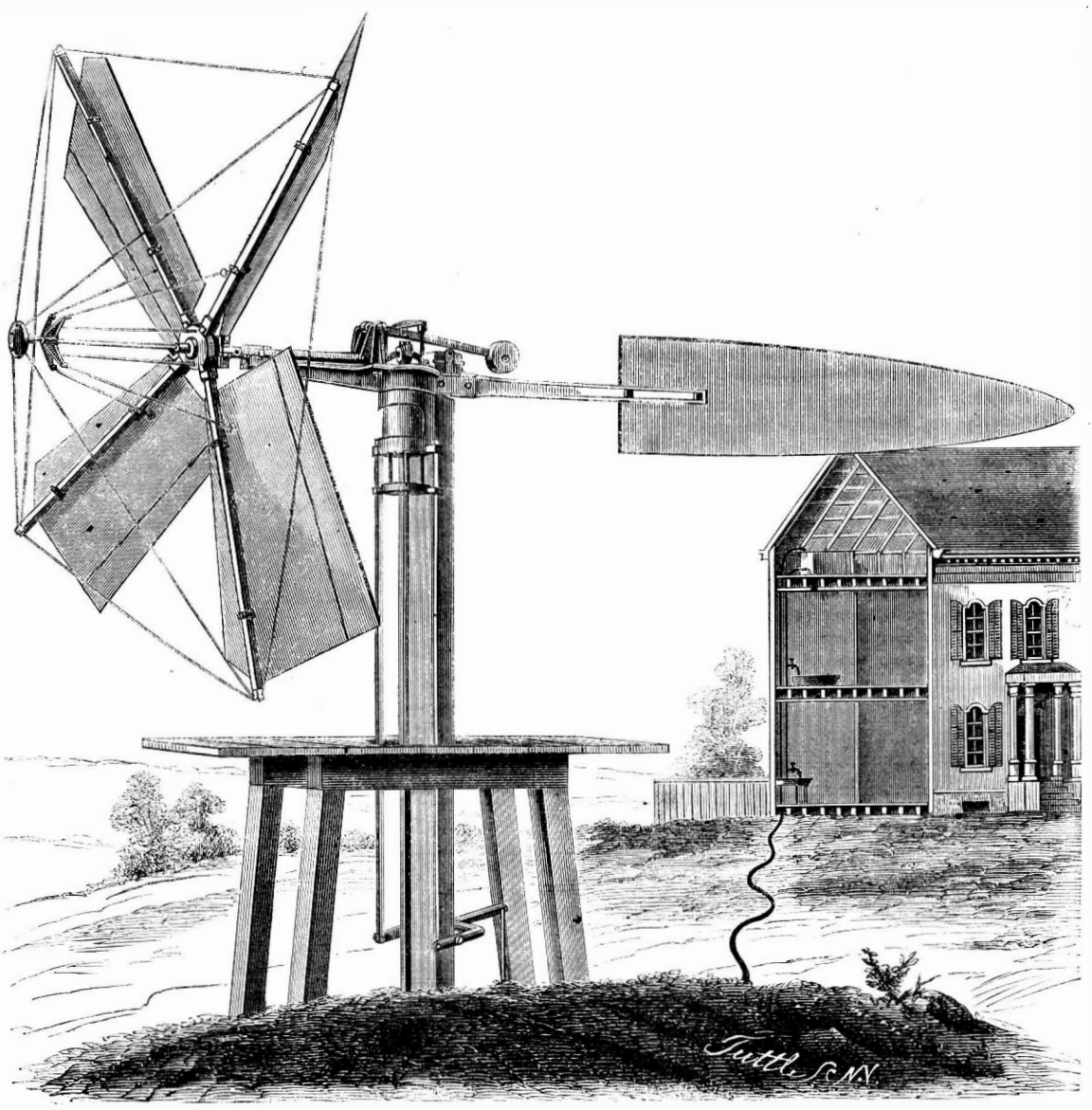
Improved Wind Mill.

It must have been at a very early period when the attention of men was first directed to the employment of the wind as a motor. Its force being so evident to the senses, there is little doubt but it was one of the first means which man employed as his servant. The lack of regularity in its motion, and the entire failure of motion in a calm has however driven it from competition with steam or water, as a motor for manufacturing purposes where steadiness and reliability are requisites. Still, for some purposes and in some situations, the wind mill is cheaper and as useful as any other motor. The attacks of prejudiced advocates of mechanical progress on this old-fashioned machine have proved as futile as those of Don Quixotte, and the wind mill still holds its own as a valuable adjunct of man's efforts. The dyked level of Holland is thickly studded with these machines employed in raising water, and for this purpose, the wind mill deservedly continues to hold a high position. In this work continuity of operation or steadiness of motion is not very important, as the results of the work performed when the wind blows can be stored up for a season of calm.

A number of wind mills of varying construction have been introduced, but some of them have been planned apparently by men whose ideas on the action of the wind were somewhat crude, and their machines have been in some cases cumbrous or complicated and more or less liable to get out of order. The mill shown in the engraving is the production of a mechanical engineer who has devoted many years to the study and construction of wind mills, and it appears to have been planned on sound mechanical and scientific principles. It is conceded by good authority that the vertical wheel, like that in the engraving, gives out a much larger amount of power than one of the horizontal style does for the amount of surface exposed to the action of the wind; and this is, therefore, the plan of the "Sancho Panza."



HEWITT'S SANCHO PANZA WIND MILL.

The arms carrying the wings are seated in a cast iron hub and braced at their extremities by rods passing from one to the other, and also by others to a collar on the end of the horizontal shaft. From the wings extend other rods which connect with the arms of a "spider" turning loosely on the shaft and made to slide on it. The wings are pivoted to the radial arms so that they can be turned to present their surfaces at angle more or less acute according to the force of the wind. From the "spider" pass rods parallel to the shaft, connected to a collar on the shaft to which connections are pivoted which, by vertical bars, are attached to a lever having a shifting weight. From this lever, rods extend down the upright and connect with another lever and rope, by pulling upon which the sails may be set to any angle desired or directed with their edges to the wind to stop the machine. By means of a crank, motion is given to a pump rod or to any other machinery.

The engraving represents a wind mill forcing water from a well into the upper story of a dwelling, filling a tank from which the water can be led to a bath tub, sink, or any other receptacle for domestic uses. The sails are at all times presented to the wind by the vane.

This mill was patented Feb. 19, 1867, by Frederick Hewitt, of Newark, N. J.

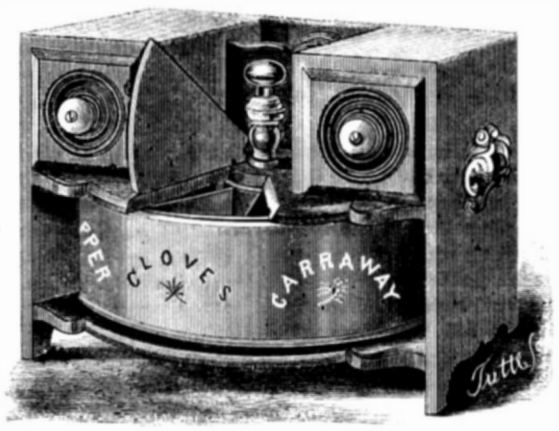
It is very strongly built, is cheap, and always under perfect control. There is no portion of it which cannot be repaired or replaced by any ordinary mechanic. It may be seen at J. D. West & Co's, 40 Courtlandt street, New York city, who will answer all inquiries relative to it.

A Curious Formation.

A London paper states that at a certain point in the Thames where an eddy accumulates a shoal of sand, agglutinating springs rise from beneath and progressively convert the sand into rock, which has to be removed, from time to time, by blasting. Bourne, the engineer, conceived from this circumstance the idea of turning quicksands to firm foundations by a similar process, and actually proposed to do this for the railway bridge over the Soane in India. Quicksands at this point as deep as borings had been made, were to be converted into rock by injecting them, through perforated pipes, with sufficient iron water, from a hill of iron pyrites near at hand, to stick together the whole mass. The line of the road was eventually altered, and the bridge was built at another point; but Mr. Bourne still believes that an expedient of this kind will become a valuable feature in engineering.

WALKER'S IMPROVED SPICE BOX.

The prudent housekeeper is a lover of compactness and of conveniences for storing. The engraving herewith presented is that of an elegant combination cabinet for keeping the



spices and similar condiments used in the culinary art. It needs scarcely any description, as the engraving gives an excellent representation. A case of mahogany, black walnut, or other ornamental wood is provided with drawers at the sides under which is a rotating tin box in the form of a cylinder divided by radial partitions into eight compartments, each having the name of the spice it contains painted on its front. The cover has but one opening, that in the front, and the receptacle is rotated by the knob on the top of the stud on which the box turns. It is neat, handy, and convenient and will commend itself to every housewife.

A patent for this device was issued through the Scientific American Patent Agency August 21, 1866, to A. J. Walker, whom address at Lowell, Mass., for additional particulars.

Cause of Milk Sickness.

This pernicious affection of domestic animals is sufficiently mysterious and important to have induced the Legislature of Illinois, some years since, to vote a handsome reward to any one who should discover its cause. The *Medical and Surgical Reporter* gives information from three separate observers (one quoted from the *Missouri Republican*) tending to throw the responsibility upon a common and hitherto unsuspected plant, *Eupatorium Ageratoidis*. It is a coincidence, that two if not three of the discoveries were originally made in the same year, 1860. Mr. Wm. Jerry, of Edwardsville, Ill., in June of that year, gathered the plant by mistake for the nettle, and (alone) partook of it as boiled greens. On the next day he was suddenly seized with the usual symptoms of milk sickness, violent trembling, prostration and faintness, accompanied on the day after by vomiting, violent retching, and a fevered state of the stomach. He did not recover from these effects in five years, during which period he took pains to make himself acquainted with the plant which had caused them, and tried it upon animals with similar results. When in bloom, animals are said to like it.

Dr. Amos Sawyer, of Hillsboro', Ill., adds his testimony to the above. Mr. R. N. Lee, of Nokomis, had given him information of a plant with which he had repeatedly produced milk sickness in animals, and supplied him with a quantity for examination. His own experiments confirmed the report of Mr. Lee, and a botanical report by Dr. McPheeters, of St. Louis, coincided with that before procured by Mr. Jerry from Mr. Enno Sanders, chemist. The following is the description: "Eupatorium Ageratoidis L. (white snake root), smooth, branching, three feet high, leaves broadly ovate, pointed, coarsely and sharply toothed, long petioled, thin (four to five inches long), corymbs compound." Mr. Jerry promises to try the plant further upon cows the coming season. Dr. Sawyer states that the milk sickness is caused only when cattle range in the woods, and that the disease is always confined within certain well defined boundaries.

[From our Foreign Correspondent.]

LAST WORDS FROM ENGLAND.

LONDON, March 23, 1867.

THE ENGLISH DOCKS—THEIR "WHY AND WHEREFORE."

This letter will be my last from England, as I shall go to Paris next week to be present at the opening of the Exhibition. There are many things, however, of great interest, and that would afford material for study, which we have not been able yet to consider. Thus, it is proper that I should say a few words about the docks so generally in use here, since we have next to nothing of the kind with us, and every body has heard the praise of the Liverpool docks at least. The use of these is rendered almost imperative from the great rise and fall of tide which prevails all over Europe, but especially in the channels by which England is surrounded. At Liverpool this amounts to 25 feet, and at places in South Wales on the Bristol Channel the daily rise is 30 feet. This of course produces a very rapid current, which, added to the inconvenience arising from such a great change of level, would render loading and unloading vessels in the open stream a matter of some difficulty. The bottom is in general soft mud, and at low tide this is exposed in large banks, and vessels are in most cases high and dry upon these, presenting rather an odd appearance. But aside from any reasons of this nature, the

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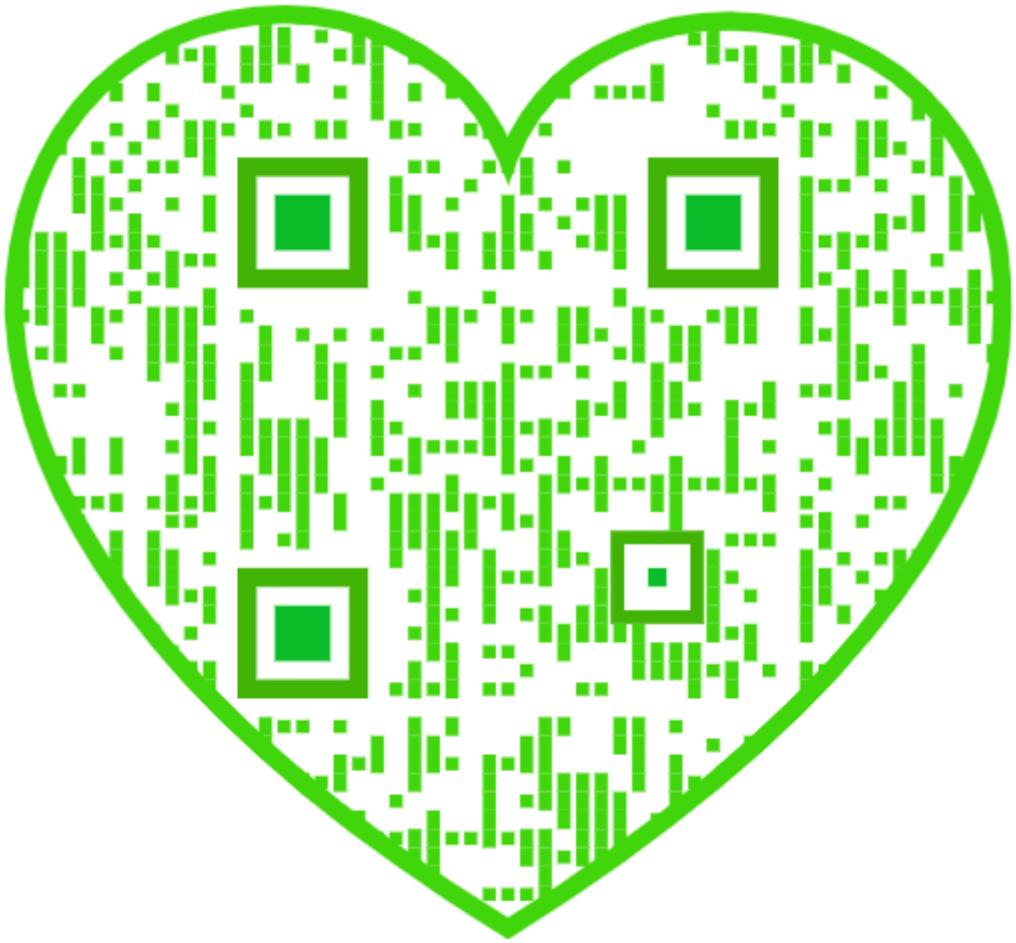

use of docks affords very great facilities for receiving and discharging cargoes, besides giving an amount of accommodation that could not otherwise be obtained. It must be remembered that the extent of water frontage, with depth sufficient for large vessels, that exists in New York, is wholly exceptional, and it is quite certain that no port in Europe compares with it in this respect.

DOCK MACHINERY.

The docks are of course built of the most substantial masonry, and in general are thoroughly provided with hydraulic machinery both for opening and closing the gates and for discharging merchandise from the vessels. Sir Wm. Armstrong has made a specialty of this kind of machinery, and its efficiency is certainly admirable. The power is furnished by a large pumping engine placed at a convenient point, and the water under pressure is conveyed by pipes to the various parts of the dock at which it is to be used. Beneath the pavement are placed little hydraulic engines which are driven from this source, and by means of suitable gearing work the gates. These engines consist of a flat bed plate supporting a short and stout pinion shaft by means of two pillow blocks, the pinion and two eccentrics being placed between them. At each end of this shaft is attached an oscillating cylinder of say 2½ inches diameter by 18 inches stroke, the trunnions be being placed near the front end. The piston rod has half the sectional area of the piston, and when at work the front end is constantly under pressure, and the valve, which is detached from the cylinder, being placed directly in front of its eccentric, has only to admit and release the water to and from the back end. The throttle valve is also separate, each part being bolted independently to the bed plate and the connections made by suitable pipes. These engines are also employed in deep mines where the hydrostatic pressure is sufficient to furnish the power, and are obviously well adapted for such a purpose from their compactness and the absence of the refrigerating effect accompanying the use of compressed air.

THE HOISTING CRANES.

The cranes are constructed with wrought iron jibs made fast to a central column which is revolved by means of hydraulic apparatus placed below ground. This consists of three horizontal cylinders of four or five feet length; two for swinging the jib and one for hoisting. The ends of the piston rods carry two or more sheaves and a chain, one end of which is fastened to the cylinder, passes over the sheaves and over corresponding ones bolted to the back end of the cylinder, and thence to the crane. The motion of the piston is thus multiplied four or more times, according to the number of sheaves, for the power required. The water discharged from the hydraulic cylinders is returned by a second set of pipes to the water tank in the engine house, to be pumped over again.

But the way these things are exposed to the weather would never do in our climate. I happened to visit the docks at Penarth, in South Wales, during one of the cold snaps which occurred this winter, and with coal fires burning around the pipes at every point they were unable to prevent them from freezing just as they did in dwelling houses and everywhere else. I have been very much astonished at the utter absence in all these arrangements of any provision to resist the effects of the cold that is always experienced at some time during the winter, a lack which gives rise to endless annoyance.

The pressure employed is very great. At Penarth the steam cylinders of the pumping engine are 18 inches in diameter and the bore of the pump 5⅛ inches, with a piston of the same size and a rod 3¾ inches diameter, or half the sectional area of the piston, the two ends of the cylinder being in connection so that the water discharged at each stroke is equal to half the contents of the cylinder. The steam is carried at 60 lbs. pressure and cut off near the end of the stroke: this must give, therefore, nearly 1,100 lbs. per square inch pressure in the water pipes. The engine remains under steam at all times but only runs when water is used at some part of the dock, starting automatically as the water is released. To maintain a constant ready pressure at all times, an accumulator is added, consisting of a long vertical ram of about 14½ inches diameter carrying a weight of 80 tuns at its upper end. This falls through a certain distance while the engine is coming to its work, and is then pumped up again by the latter till it reaches the limit of its stroke, when by a connection with the throttle valve it shuts off the steam from the engine.

Very extensive docks have been constructed within the past few years at Marseilles, and they are said to be the finest in the world, next to those at Liverpool.

THE ENGINEERING ASSOCIATIONS.

There is one exceedingly pleasant as well as useful feature of engineering as it exists here, which unfortunately does not find its counterpart in America. I refer to the societies formed among the leading engineers, at whose meetings all matters of interest are discussed. The mere statement of this will strike many, no doubt, as nothing remarkable or unknown. But it should be borne in mind that there is little more resemblance between these meetings and those of the American Institute, for example, than between daylight and darkness. It is easy enough to form a society and to hold meetings, but the interest attaching to these of which I speak is that they are composed solely of the prominent engineers, and the discussions taking place at the meetings are not in reference to somebody's patent invention which is of great interest to himself and of little to anybody else, but relate to important works in progress or embody the results of theoretical research on questions of real moment. When men like Mr. Scott Russell, Mr. Hawkshaw, Mr. Fowler and others of the same class, are regularly present at the weekly meetings it is good *prima facie* evidence that the character of the discussions is such as to make it an object for them to attend. The first place in the number of these societies is held by the Instution of Civil Engineers, whose meetings are held in London every Tuesday evening during the winter. Then there is the Institution of Mechanical Engineers, also composed of men of the highest order of ability, their meetings being held annually at different towns according to appointment, that of this year to be held in Paris. The Institution of Naval Architects is another able body, holding a meeting each spring which lasts two or three days, and besides these there are a number of less pretentious societies, which are nevertheless useful and accessible to many who could not hope for an election to one of the first named.

Every paper read before one of these societies is first submitted to the council and passed by them, and having thus been pronounced of sufficient interest to be brought before the institution, it is read by the secretary and is then open to discussion by the members. When the question is one of interest, the discussion sometimes lasts over several evenings, (in the case of the Institution of Civil Engineers,) and the hall is always crowded. On occasions of special interest the most learned scientific men in the country, such as Prof. Airey, the Astronomer Royal, Prof. Forsday, etc., are often in attendance to take part in the discussion. The writer of the paper before the society is of course present and as usual in such cases has the opportunity of replying to the various remarks that have been made, at the close of the discussion. The papers are fully illustrated by drawings when required, and at the close of each year a volume of "Proceedings" is published, containing the text of the papers with the drawings and tables and a full abstract of the discussions. I suppose there is no work existing which contains such a quantity and variety of really useful matter for engineers as is contained in these annual publications. It is very difficult, however, to obtain them except through members, as it is fancied that the standard of the society is better upheld by maintaining a certain amount of exclusiveness.

These institutions are also very useful in many ways apart from their meetings. They serve as media of communication for engineers, and are of real practical benefit in this way. A foreigner, for instance, visiting England for any purpose in the scope of the profession, can obtain all the information as to the best way to accomplish his object by calling on the secretary of the institution most nearly related to his pursuit. A letter from that gentleman is an "open sesame" to almost every source of information. The rolls of these societies contain the names of many foreign engineers of eminence. I was pleased to see that Hon. W. J. McAlpine, of New York, who is at present in this country, was elected a member of the Institution of Civil Engineers at the last meeting.

There can be no doubt also that the influence of these societies is most salutary on young engineers, by in the first place showing them clearly what an engineer's profession is, what an amount of knowledge it requires and of what kind, by affording an opportunity of hearing opinions expressed and discussed by competent engineers on practical questions, from which far more is to be learned in most cases than from books, important as they may be; and further by placing before them a tangible object of ambition, for I suppose every young man entering the profession looks forward with considerable pleasure to the time when he shall be able to secure an election to one of the first-class institutions.

Something of this kind we certainly ought to have with us, but I fear it would require a deal of hard work to get it in operation, for the reason that those engineers who have knowledge and experience enough to make such an organization valuable will not give their time and attendance to it, and unless they are willing to do this it becomes but a rendezvous for men of one idea desirous of expatiating on their particular hobby. As engineering becomes more respected as a profession, and a higher grade of education becomes general among its members, we shall no doubt find the necessity for such institutions appreciated, and the want adequately supplied.

SLADE.

ODD WATCHES.

From All the Year Round.

Early watchmakers, patronizing the vegetable kingdom, adopted the forms of fruits and flowers. In the Bernal collection (a rare medley of artistic odds and ends) there was a Nuremberg watch in the shape of a pear, in parcel gilt silver. Another, shaped like a melon, was made by a Frenchman. It is only one inch and a quarter in diameter and has a key in the form of a melon-leaf. At the South Kensington Museum is a very small apple-shaped watch, about a century old, with a gold enamel case studded with seed pearls. One of the old watches of Nuremberg has the form of an acorn, and is provided with a small wheel-lock pistol, which is supposed, to have been used as an alarm. One watch, talked about by the archæologists, is in the shape of a tulip, with three crystal faces. Another having the same form, but scarcely an inch in diameter, is so constructed that the leaves or petals of the flower open a little at the bottom of the watch, disclosing a small spring which, when pressed, pushes up the lid and shows the dial face.

Mr Bernal had a watch in which the works were contained within the body of a tiny eagle; the imitative bird opened across the center and displayed a richly engraved dial plate, while the exterior was rendered classical by the story of Jupiter and Ganymede: it might either be worn suspended from the girdle by a ring or be rested on a table by means of three claws. Ducks have sometimes had a share of watchmaker's attention bestowed upon them. Witness a duck-shape watch about two inches and a half long, in the South Kensington Museum, and another in a private collection, in which the feathers of the duck are chased in silver, and the lower half when opened, exhibits a dial-face decked with jewels.

A whole class of watches were for generations known as Nuremberg eggs. One, supposed to have belonged to James I., is of a flattish egg shape, the outer case plain, the inner elaborately engraved; the face has a calendar, and wherewithal for showing the moon's age. Another, existing in a private collection, is an egg cut out of a jacinth, with the dial-face visible through the transparent jewel—a very beautiful mode of indulging in these crotchets. In the Dover Museum is a double-cased egg watch with two movable dials, one for showing the hours of the day in the usual fashion, and the other for the names and days of the month; there are also means for denoting the day of the week and the position of the sun in the zodiac; and—an oddity indeed the hands go the reverse way from those in ordinary watches, or from right to left, as if the artist's notion of time took a backward direction. In Hollar's set of four engravings of the Four Seasons, a lady is represented in the character of Summer, with an egg watch suspended from her girdle.

Surely the most dismal of all watches must have been those shaped in the form of a skull or death's head, intended doubtless, as mementoes of the fleetness of time and the brevity of man's existance. Many examples of this class are contained in various public and private collections. One of these, small in size, is of silver and has a ring at the top to suspend it from the girdle; the lower jaw of the skull opens, and there displays the dial face. Another of the doleful family, made in the seventeenth century, opens at the lower jaw to show what's o'clock, and has inscriptions on the outside. When Diana of Poictiers became mistress to Henry II. of France she was a widow, and the courtiers of the sovereign, to ingraciate themselves with the favorite, wore death's-head watches as a kind of complimentary mourning. But the most celebrated death's-head watch, once belonging to Mary Queen of Scots, was that which the royal lady gave to Mary Seaton her maid of honor, and which afterward came into the possession of Sir Thomas Dick Lauder. It is of silver gilt. The forhead of the skull bears the symbols of death, the scythe and the hour-glass, placed between a palace and a cottage to show the impartiality of the grim destroyer; at the back of the skull is Time destroying all things, and at the top of the head are scenes of the Garden of Eden and the Crucifixion. The watch is opened by reversing the skull, placing the upper part of it in the hollow of the hand, and lifting the jaw by a hinge, this part being enriched by engraved representations of the Holy Family, angels and shepherds with their flocks. The works of the watch form the brains of the skull, and are within a silver envelope, which acts as a musically toned bell, while the dial plate serves as the palate. This very curious work of art, which was made at Blois, is too large to be carried as a pocket watch.

Some of the old watchmakers were remarkably smitten with a taste for astronomy, dealing with the heavenly bodies in a way which modern watches seldom aspire to. There is an oval silver watch by Dupont, with index hands to show the hour of the day, the day of the week, the day of the month, and the age of the moon, while there are other arrangements for denoting something about the constellations; and inside the cover are a sun-dial and a compass.

Jean Baptiste Duboule, of Geneva, made a large watch which denotes the four parts of the day, the hour of the day, the day of the week, the day of the month, the name of the month, the sign of the zodiac, the age of the moon, the phase of the moon and the four seasons of the year; far too complex probably, to be really reliable as an astronomical guide, seeing that the smallest disarrangement in any little wheel would throw sun, moon and earth into awful catastrophe. More practicable was a watch made by a Polish peasant, Kuhaiesky, at Warsaw, which denoted the time at different places under different longitudes—a contrivance which we have seen imitated in a modern English watch. One of these mechanical conundrums was found among the loot of the Emperor of China's Summer palace at Pekin, when captured by the English; it was at the time of Louis XVI., and is supposed to have been presented to the Son of the Sun and Moon by that sovereign: it was a telescope enriched with pearls and enamels; but when we are told that "the object glass is formed of a watch set with pearls," we confess to being puzzled.

Some good people in past times affected the wearing of watches in ways not often adopted just now. Archbishop Parker, in a will drawn up in Latin rather less than three centuries ago, said. "I give to my reverend brother Richard, Bishop of Ely, my stick of Indian cane which hath a watch in the top of it." Several other walking stick watches are still preserved in collections of *bijouterie*; while watches in rings, are still more common. One of the Electors of Saxony used to have a watch in his saddle. The Earl of Leicester gave to Queen Elizabeth, as a New Year's gift, "one armlet or shakell of golde, all over fairly garnished with rubyes and dyamondes, haveing in the closing thereof a clock,"—that is, having a watch in the clasp. The courtly dames of those times often carried a watch suspended to a chattellaine, with keys, seals, minatures, brologues, etc. Cruciform watches were much coveted by pious persons, who reverenced the symbolism embodied in them. One such, about two centuries old, is called a *montre d'Abbesse*, and is supposed to have been made for the lady superior of a religious house; its surface bears numerous scriptural designs in relief. Another, however which was in the Bernal collection, had quite as much heathenism as scripturalism about it: seeing that it was engraved with figures of Diana and Endymion. Once now and then ladies wore watches in the form of a book the cover being pierced to show the hours on the dial.

All sorts of ingenuity were exercised in selecting the materials, forms, and arrangements of watches. They were as is well known, brought into use as substitutes for the hour-glass which was wont to be carried by professors, judges, and other persons who required easy means of determining the

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lapse of an hour or any aliquot part of an hour. When the real watch was first introduced there was no metal chain connected with the mainspring, its place being supplied by catgut. A watch of this kind was given by Mary Queen of Scots to an attendant on the night before her execution. Some of the watches were made of crystal to render the beautiful mechanism of the works visible. Some have had the twelve letters of the maker's or owner's name to do duty for the twelve figures on the dial. Some were pedometer watches, one form of which is still used. Napoleon had one that wound itself up by means of a weighted lever which rose and fell at every step: but those now made are for measuring speed in walking, which can only be useful to those who make regular steps of given length a known number of which equal a mile. Some are touch watches, to be used in the dark or by blind persons. There are twelve projecting studs around the rim of the case; an index hand, at the back when moved forward, stops at the portion of the hour indicated by the dial; and the index and studs together enable the time to be felt by the fingers.

The attempts to produce sounds of various kinds in a watch have been numerous. The celebrated French maker, Breguet, was famous for repeating watches of this kind; and the sovereigns of Europe were ready enough to give him two or three hundred guineas for one. Of course alarms are more simple, seeing that the mechanism is required merely to ring a bell at some definite and pre-arranged hour in advance. Charles the First kept an alarm watch at his bedside at night; the outer case enclosed two silver bells which struck the hours and quarters. M. Rangouet, a French maker, about a century ago, is credited with the construction of a musical watch, of the common pocket size, which played duets, and the works of which were so nicely adjusted that the musical portion and the time measuring portion did not interfere with each other. This is far surpassed by a watch about the size of an egg, constructed by a Russian peasant in the time of the Empress Catherine the Second, and now preserved in the Academy of Sciences at St. Petersburgh. This elaborate work is both a repeating watch and a watch that that performs a chant. Inside is a representation of the tomb of Christ with Roman sentinels on guard. On pressing a spring, a stone rolls away from the tomb, the sentinels fall down, angels appear, holy women enter the sepulchre and sing the same chant which is still sung in the Russo-Greek church on Easter Eve. A story is told of some missionaries at Tongataboo which shows that the exhibitors of talking and singing watches are apt to find their own reputation rise and fall with that of the mechanism itself. The real instrument was a cuckoo clock, but it would apply to watches as well. The natives believed that the missionaries cuckoo clocks were inhabited by a spirit, and regarded them accordingly with oeverential awe. One of them bolder than the rest, picked rne of the clocks to pieces to have a peep at the spirit. Of course he could not put it together again; and the fame of the missionaries was damaged when it was found that they also were powerless in the matter. There is some mention made of watches which actually talked, emitting articulate sounds in the form of words: but this we deem doubtful. Vocalization or singing is a very different affair; this can unquestionably be done by pieces of mechanism much smaller than a pocket watch—as the Swiss Nightingale at the Great Exhibition testified.

One recorded watch was very big—viz., that which was made for the Irish giant, about eighty years ago; the works were very strong, and the watch with the seal and key weighed nearly a pound. Far more numerous, however, have been the tiny watches, marvelous on account of the quantity of mechanism compressed within small spaces. One of these is about the size and shape of an almond. At the first of our great exhibitions, the Swiss exhibited a watch only three-sixteenths of an inch in diameter, inserted in the top of a pencil case; it showed hours, minutes, seconds and the day of the month. An English specimen, the size of a threepenny-piece, was a giant to it. The Annual Register, about a century ago, told of a watch only the fifty-fourth part of an inch in diameter; but this, we suspect, must be a mistake for fifty-four hundreds of an inch—a very different affair. Arnold presented to George III. an exquisite watch of the size of a silver penny, set in a ring: It consisted of 120 separate parts, the whole of which weighed together less than six pennyweights. And so intricate were the works, that Arnold had to make tools himself before he could make the watch. The King was so delighted with the work that he sent Arnold 500 guineas. When the Czar of Russia heard of this, he offered Arnold 1,000 guineas to make a similar one for him; but this the artist refused, determined that his own sovereign's watch should be unique.

NEW PUBLICATIONS.

PARIS EXHIBITION—NEW MAP OF PARIS. New York: Wiley & Son.

A very valuable map of Paris together with views of several prominent public buildings.

BACK BONE.—Edward H. Dixon, M. D. 396 pages.—R. M. DeWitt, New York.

This volume contains a series of very sharply written essays upon medical sense and nonsense which are always amusing and sometimes instructive. Dr. Dixon is a keen writer and has a good deal of slap dash about his style which pleases many people.

A NEW AND PRACTICAL SYSTEM of the Culture of the Voice and Action, and a Complete Analysis of the Human Passions, with an appendix of Readings and Recitations. Designed for Public Speakers, Teachers and Students. By Prof. J. E. Frobisher. New York: Ivison, Phinney, Blakeman & Co. 12mo. 264 pages.

The author lays no stress on originality, but acknowledges a free use of the views and teachings of predecessors. A clear and lively style adapts the work not to the professed student alone, but to all the large class of self-improvers. We trust it may prove to them a valuable instructor tn the most manly of arts, the art of public speaking.

Editorial Summary.

SOURCES OF THE GREAT LAKES.—A writer in *Silliman's Journal*, comparing the insignificant river tributaries of the great lakes with the body of water discharged through the St. Lawrence, concludes that they are fed by under-ground currents from distant mountain regions. Although the ample drainage of Wisconsin and Minnesota is discharged mainly into the Mississippi and Red rivers, it does not strike one as very unlikely that a river of the size of the St. Lawrence at its source, should accumulate from the innumerable streams and rills that drain a lake coast of three or four thousand miles. The artesian wells of Chicago are presented as an argument for the existence of subterranean inlets—yet why not outlets also?—in the bottom of Lake Michigan, which lies lower than the supposed water-bearing stratum which sends up its water through those wells to a height of nearly 125 feet above the surface of the lake. We do not perceive how these facts can be reconciled with the theory of any subterranean current in the case, unless by the violent assumption that the current turns a short corner within a few feet of the lake. Certainly this current cannot have any considerable outlet in Lake Michigan and at the same time another 125 feet above it. The circumstances as stated seem almost to require some other theory, such as that of elastic subterranean pressure, to account for the artesian wells of Chicago. That there are springs of more or less volume in the beds of these lakes, which would form streams and a main river if the lakes were drained, may be assumed as a matter of course; but it strikes us that if great subterranean currents intersect the lake, they are likely to flow out of it in the same manner. In other words, a subterranean system of water courses is as unlikely to have its continuity broken up by encountering a lake, as a superficial system.

IRON MOUNTAIN.—There you see over five hundred acres of a single mass of solid iron—hardly an ore. A piece of it is like cast-iron to look at, and apparently as heavy. The road over which we walked was iron; the loose pebbles with which the surface of the mountain is plentifully covered, are all iron. A light soil, bearing some trees and bushes, covers the hill. But in many places and enormous moss-covered blocks of ore just above the surface. In one of the mines in which the men were working, we saw a solid and almost perpendicular face of ore sixty feet high. Pilot Knob too, is an iron mountain, but covered with strange broken crags and wild rocks, crusted together like towers, castles and antique tombs, which had been three-quarters melted at doomsday, and then suddenly cooled. It is a grand and strange hill, rising steeply for nearly six hundred feet; alone in a beautiful country, a quiet, fertile valley sweeping around. In this tranquil lowland lie two villages, and far beyond rises Shepherd mountain, which is a still larger pile of iron ore.—*Philadelphia Press.*

PHRENOLOGY RUN MAD.—A Paris letter gives us an account of the investigations of the "physicians" (?) in the brain of an executed murderer, whose utter insensibility and preternatural depravity had led them to expectations analogous to those which prompted an old lady before them to open her hen. The conceit of finding a tangible store of moral materials or material morals in a man's skull is unphilosophical, however, in comparison with the notion that eggs may be found where they come from. "Huge protuberances" of "sanguinary instincts" were found in the cerebellum of this parricide (who had murdered his father to prevent a distasteful second marriage) and the sapient inference is suggested that the plea of insanity now usually made in cases of murder so foul and unmistakeable as really to exclude every theory but the scriptural doctrine of hopeless depravity, may after all have "a scientific foundation." Certainly it will, when an empirical craniology becomes "science," and determines moreover, that this machine of the soul is but a hand organ bound to grind unalterable tunes in obedience to its progenitor instead of its proprietor.

THE LOCOMOTIVE STRIKE in England is reported to be in a way of being happily averted by mutual concession. Its consequences would have been too serious to the public, and would probably have damaged the cause, if not resulting in abridgement of the liberties, of trades unions in that country. Society must and will exist, right or wrong, whatever else has to be crushed under its necessities; but a strike on the locomotives would have the power almost to paralyze society in an hour, and such a power as that could never be long tolerated by any people. Both parties have done wisely in coming together. Otherwise, the obstinate side would have had a heavy reckoning to meet, proportioned to the public calamity.

THE GREAT EASTERN.—The monster ship, after an absence long enough to cover several of the greatest revolutions that ever took place in national affairs, appeared once more in sight of our harbor on the 9th inst., at six o'clock, A. M., and a few hours later was quietly at anchor off Thirteenth street, attracting as little notice as could possibly be bestowed on so big a ship and so great a stranger, with such an eventful history. Her passage occupied 14 days. The appearance of the ship is not one so flattering to the company who have refitted her, as we had been led to expect. The most important changes she has undergone, have been the renewal of her screw boilers and the introduction of steam steering apparatus.

CHARCOAL from the shell of the cocoanut is found to have extraordinary power of absorbing gases. It is very dense and brittle, and its fracture presents a semi-metallic lustre.

SNOW ANIMALCULES.—A distinction is observable between the taste of snow water and that of rain water, and the use of the former in parts of Switzerland is thought to be the cause of peculiar affections of the throat, including *goitre*. The discovery of numerous shrimp-like animalcules in snow water, by a distinguished chemist, has suggested a possible connection between them and the unwholesomeness of snow water. They prove at least that life is not restricted to the conditions of temperature with which we usually associate it. The fluids which give mobility within these organisms must be such as, unlike those of animals, and like alcohol, resist extremes of cold.

OXYGEN IN THE MARKET.—A company has been formed in Paris under the style of Jos. de Susini & Co., for the manufacture and sale of oxygen to be mixed with ordinary illuminating gases. The calculation is that an addition of one third oxygen will be equivalent to multiplying a given quantity of illuminating gas eight times, the price of oxygen being fixed at only 2½ times that of ordinary gas. The superoxygenated gas will be used in lighting the International Lecture-room of the Exposition.

CHILLED RAILROAD WHEELS.—We are indebted to Mr. W. W. Evans for a communication in favor of the American chilled wheels, which we should publish with pleasure if we had not done so substantially, a few weeks ago. On page 108 (Feb. 16) our correspondent will find the substance of his own letter to *Engineering*. Our paragraph of April 13, representing the opposite view, includes statements and arguments which we should be glad to have answered by anybody who can overcome their force.

HOTTINA.—This is a powder compounded by M. Hottin, of Paris, for making linen fire-proof without impairing its whiteness, when mixed about equally with the starch, a like quantity of gum being also added. It is prepared by adding a little ammonia to a solution of phosphoric acid lime, and filtering with animal carbon, then evaporating until concentrated, when five per cent of gelatinous silicic acid is added and the whole evaporated to a crystal substance and pulverized.

PUBLIC VERSUS PRIVATE ROADS. is to be one of the grand "causes" before the popular tribunals of the age. Our remarks on the subject have been widely circulated in other journals, and original articles in strong terms have presented the question to the people. Among the indications of the general drift, we notice that the Russian Government is negotiating a purchase of the Moscow railway. The price demanded is said to be equal to some $54,000,000.

A NEW ALKALOID, named Rhæadine, has been discovered by Hesse in the red poppy and in opium. It is soluble in water, alcohol and ether, crystallizing from the last in white prisms. Ammonia precipitates it in white crystalline flocculi, bichloride of mercury gives a white amorphous precipitate, chloride of gold a yellow precipitate, and strong acids decompose it in the gold, giving a purple solution.

THE SNIDER RIFLE.—The press report of the unsatisfactory behavior of this arm, which we quoted, has brought out the Duke of Cambridge and General Peel in its defence. The former states that no imputation rests on the Snider rifle and affirms that it is better than any arm possessed by the army of any other nation. A natural and comfortable official belief.

TANNING WITH CHESTNUT WOOD has been introduced to the notice of "La Halle aux Cuirs" of Paris, by J. Algetiere, jr., a tanner at Lyons. He claims that the tannin obtained from this source instead of the the bark, makes leather of peculiar fineness, uniformity and excellence of color, and superior quality in all respects as compared with the best oak tanned.

THE COLORADO GOLD ORES are to be attacked by the Welshmen. A large lot of these difficult sulphuretted ores have been taken out to Wales and there reduced with such success that capital has been raised to bring out Welsh smelters and put up extensive works on the successful plan in Colorado.

SUSTAINED TEMPERATURE.—Evidence that the length of the day has not perceptibly varied since the time of Anaxagoras, is considered to prove that the volume of the earth has not been sensibly modified, and therefore its general temperature has not varied so much as 1-300th of a degree, in 2,000 years.

CARBONIC ACID reveals itself in the spectrum by several new lines coinciding with the spectrum of graphite: one of the most characteristic being a red line rather less refrangible than the hydrogen line.

A JOB FOR ENGINEERS.—The Legislature of Maryland has voted an appropriatien of $150,000 to construct an ice boat for clearing harbors of ice.

GLASS ENGRAVING is said to be done with a solution of fluoride of calcium in hydro-chloric acid, without the danger attending the use of fluoric acid, and equally well.

RATS, it is said, may be destroyed by injecting into their haunts sulphuret of carbon in vapor, equal in volume to one-twentieth the area.

THE FLORIDA AND CUBA CABLE, 110 miles in length, is being made in England by Silver & Co.

GLUE FOR METALS.—Melted glue 16 parts, in which mix gum ammoniac 1 part and then add one part saltpeter acid.

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DAMASCUS STEEL.

Probably there are many of our readers who have never seen a genuine Damascus blade either a saber or razor, but there is quite a trade still carried on in these articles notwithstanding the common opinion that the manufacture is to be reckoned as among the lost arts. To the eye the surface of Damascus steel presents a variegated appearance, silvery and dark lines crossing each other in a sort of irregular net work. One of the finest specimens we have ever seen was a sword blade, more than three feet long, a present from a Tartar Emir to a former United States minister to St. Petersburg.

This steel is very generally imitated in appearance by English manufacturers, but their specimens do not possess the rare qualities of the genuine article. As nearly as can be ascertained the foundation of these blades was the Indian "wootz." This is smelted from a magnetic oxide, yielding, by the crude process employed, only about fifteen per cent. About a pound of the ore is placed in a clay crucible with bits of dry wood, covered by green leaves of particular plants. The crucibles are luted with clay and submitted to a blast charcoal furnace. The fire is kept at the highest possible temperature for nearly three hours, and on removing from the fire and cooling, the crucibles are broken and the steel found as a lump or button at the bottom. Selections are made from these lumps and those which are accepted are exposed again to a red heat for several hours and then drawn out under the hammer. This "wootz," or Indian steel, is considered superior for cutlery to any of the English make. It is supposed the Damascus blades were forged from this steel, which is still made in Persia as well as in Hindostan.

It has been supposed that fagoting short bars, remelting, and working them over and over, was the true secret of the superiority of the Damascus blades; but this does not seem to be sustained by experiment. Some years ago Gen. Anossoff, a Russian, made many experiments with great minuteness of detail, and finally he established works at Zlatoosk in the Ural where were mines yielding the ore he desired. His most successful process was melting the ore with graphite in crucibles in the proportion of eleven pounds of ore with five of graphite, and one thirty-second part of iron scales with a small quantity, one twenty-fourth, of flux, as dolomite or magnesium limestone. The crucible is placed in a blast furnace and kept from four to six hours.

The following are Gen. Anossoff's requisites for the best steel; Charcoal of the clearest sort, as that from pine; a furnace of the most refractory materials; the best quality of crucibles; iron very malleable and ductile; pure native graphite or that obtained by pulverizing the best crucibles; flux of dolomite or calcined quartz; a high temperature, and fusion continued as long as possible. The working after the crucible is cold is simply repeated heatings and forgings. The sword blades are tempered in hot oil. The razors made from this steel are of very superior quality, but the cost is excessive; the steel being valued at $1·10 per pound. The blades produced by Gen. Anossoff seem to be of equal value with the original Damascus blades, one of them cutting through a gauze handkerchief floating in the air, cleaving bones and even nails without injury to the edge. Gen. Anossoff died in 1851, and it is said the cutlery made at his establishment is not of so good a quality as when he personally superintended its manufacture.

The Force of Expansion by Heat.

It has been found by experiment that a bar of malleable iron of a square inch in section is stretched one ten-thousandth of its length by the pull on it of a tun-weight, and it has also been found by further experiment that a similar elongation is produced by heating the bar 16° F. Also a tun pressure on the bar, or a cooling of 16°, will produce a contraction of one ten-thousandth of its length. Thus there is established in this case an equivalence of a tun weight and a heating or cooling of 16°. The pushing or pulling of the bar by a tun weight, and the expansion or contraction by the 16° heating or cooling, each involves the same amount of force. But it will be observed that the precise figures arrived at are the results of experiments which are of necessity crude, and that as far as expansion by heat is concerned, they show it as acting only in one direction while in fact it takes place with equal force in all directions.

The whole amount of force concerned in expansion by heat may be accurately calculated in any case from Joule's equivalent. A unit of heat, or that amount of heat which will raise 1 lb. of water 1°, implies a force which will lift a weight of 772 lbs. one foot in hight. Whenever a unit of heat is wholly used in expansion, it follows of necessity that the total force of such expansion is 772 foot pounds. But as the expansion takes place only through short distances, it is necessary to reduce the expression to other terms in order to make more apparent the enormity of its force. Then 772 foot-lbs is equivalent to 9,264 lbs. raised 1 inch, and 9,264,000 lbs. raised one-thousandth of an inch. Thus if the whole force of expansion of a mass of iron which was produced by a unit of heat were exerted in one direction, it could lift a weight of 4,632 tuns to the highth of one thousandth of an inch.

Such calculations show how enormous is this silent force, and how irresistible and terrible it might be against the feeble strength of man. Yet it is so ordered in nature that it acts only a beneficent part. The gentle wind, the refreshing rain, the changes of seasons and the flow of rivers, are only a few of the many natural phenomena which are dependent upon the force of expansion by heat.

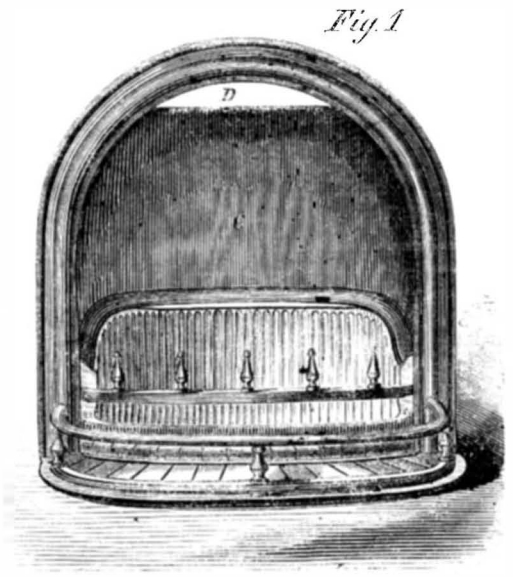
The "Cigar Ship" *Ross Winans* has recently made a successful trip in the English Channel.

DIXON'S LOW DOWN GRATE.

Those who have been brought up in the country, or city dwellers whose age enables them to remember the customs of thirty years ago, not unfrequently think with regret on the pleasures of the wide fire place with its generous glowing heat of a brilliant wood fire, or on the ample grate, which distributed the carbon prodigally and insured a perfect ventilation. With all the improvement in stoves and furnaces and the economy in fuel, we have yet to see any method of warming our living rooms so comfortable and pleasant as that of the open fire.

The engravings present two views of a grate which has been in use for many years in Philadelphia and of which a

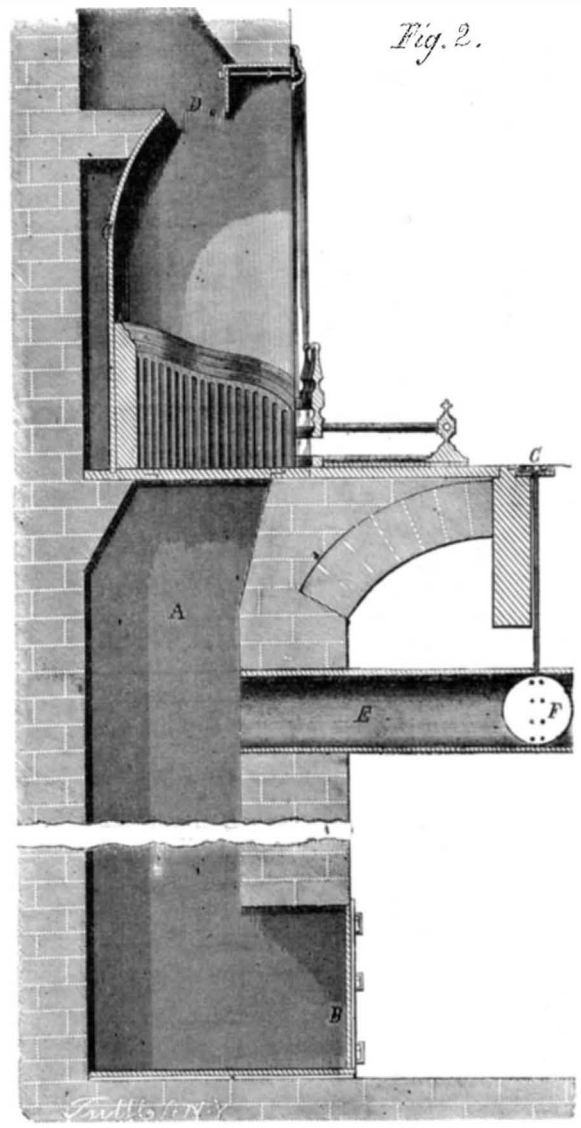
Fig. 1



number are now used in this city. Its main peculiarities are in its form, giving out a much larger proportion of the heat of combustion than others, in the fact that it does not exhaust the room of its oxygen, and that the fire is built on a level with the floor, thus warming that portion of the apartment which is always the coolest. Those who have these grates in use speak in the most unqualified terms of praise as to their action and benefits.

The fire grate is on a level with the floor, forming a portion of the hearth. This is merely a grate, the ashes falling

Fig. 2.



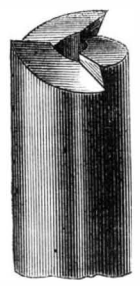
through the interstices into an ash pit, A, Fig. 2, of brick, capacious enough to hold the residuum of a season's burning, and which is finally removed through the door, B. The back, C, of the fire place, instead of being rectangular as is ordinarily the case, is concave so that the rays of heat are diverged radially to every part of the room to be heated. The heat rays are thrown downward as much as they are in horizontal *radii*, as the back is of a niche form as seen in Fig. 2, curving over to the front. This back plate is unusually high giving a great distance between the fire and the point of escape for the smoke at the throat, D, of the chimney. The ash pit for the first floor can be built of such an extent, reaching to the cellar, as to receive the products of a winter's combustion. On higher floors a more elevated fire box is used where capacious ash pits are not convenient.

The air for the purposes of combustion is not drawn from the room where the fire is situated but comes either from the cellar or from outside the house through the flue, E, the admission of air being regulated by means of a damper, F, governed by a convenient handle, G, seated in the floor. By this simple arrangement the necessity of a portable blower, which prevents for the time of its use any appreciable heat from coming into the room, is obviated, while the deterioration of the air in the room by the consumption of its oxygen is prevented thus preserving a good quality for breathing purposes and also securing a perfect circulation at all times. The throat of the chimney for the escape of gases is near the front of the fire place so that the products of combustion, traversing the curved back, must yield a large percentage of their heat before escaping.

Any additional information desired may be obtained by addressing the manufacturers, Thomas S. Dixon & Sons, 1324 Chesnut street, Philadelphia, Pa. One of the grates may be seen in the office of our neighbors G. E. & F. W. Woodward, publishers of the Horticulturist, 37 Park Row, New York city.

HANDY TO HAVE IN THE SHOP.

We present herewith the representation of the working end of a neat, cheap, and effective implement which will fill a long vacant place in the mechanic's tool chest. It is an implement intended for drawing common wood screws the heads of which have been broken. In driving home the ordinary screw the head frequently breaks, and it cannot be turned either way by the common screw driver. The same accident may occur in drawing screws which have been seated in wood for a long time, and then the wood must be cut away in order to apply a pair of pliers or similar instrument.



This tool is simply a left handed, end milling tool, cut into three radial teeth, as seen, and having a small hole drilled in the center. It has either a shank fitting a bit brace or is secured in a handle as a screw driver, and in using is turned to the left, milling off the projecting portion of the broken head until a surface is obtained, when by a few short forward and back movements three depressions are made for the teeth, and the screw is drawn as by a screw driver The small hole is for the reception of a center stud which will be formed on the screw head by the process of milling to retain the tool in position.

The engraving is enlarged from the tool left with us, but it may be made of any size to fit the screw. It is the contrivance of Lewis Garrigus, of Waterbury, Conn., who deserves the credit of presenting it to his fellow mechanics gratuitously.

Extracts from Patentees' Letters.

C. W. Royse of Petersborough, N. H. writes under date March 27th as following:—My Letters Patent came to hand to day. Please accept my thanks for the prompt manner in which you have managed my affair. I have received several circulars from Patent Agents soliciting patronage; but be assured that any business that I may hereafter have with the Patent Office will be entrusted to your care. I shall most cheerfully recommend to my friends your Agency as the only reliable one.

Mr. F. B. Moore, of Bridesburg, Pa. under date April 1st writes as following:—My patent came all right a week or so ago. The drawings are good, specifications and claims satisfactory; in return allow me to express my thanks for the promptness and good manner in which you conducted the procurement of the Patent on my Spring Bed Bottom. I am highly pleased and will always be glad to recommend your Agency and your terms to all needing business with the patent office.

Franklin Nelson, of Wyandotte, Mich., under date of April 8, 1867, says:—"I received my Letters Patent about three weeks since, highly pleased with the correctness with which you had the instrument executed. I am fully satisfied that your facility for psocuring patents are unequalled, and it will be with pleasure that I recommend your Agency to all interested. Please accept my hearty thanks."

Steptoe, McFarlan & Co., of Cincinnati, Ohio, who avail themselves of our advertising columns somewhat extensively, add the following P. S. at the end of a business letter: "We find no other medium equal to the Scientific American."

The American Hog-tamer.

Mr. Reuben Hurd, of Morrison, Ill., is the inventor of a nipping instrument to cut hog snouts, to prevent the animals from rooting. The inventor issues a neatly printed circular concerning the improvement, which bears a well executed vignette consisting of his own portrait. It is a standing figure of a good looking individual, somewhat advanced in life, holding in the left hand one of the patent hog-nippers. Opposite the picture, printed in bold italics, is the following motto: "My invention will live on, and after I am dead will still live, until every farmer shall know that I have not lived in vain."

Gopher Trap.—John Grable, of Wathena, Kansas, says his garden vegetables and fruit trees have nearly been devoured by gophers. He has been fighting his enemy for eight years with poison, traps, cats, and dogs, with such poor success that he is almost discouraged, and now appeals to inventors for assistance. He offers a hint which he considers valuable, and thus quaintly expresses it:—"A double-geared subterranean gopher trap so constructed as to catch the gopher both ways in passing through his galleries."

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GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, April 4th, Prof. Tillman presiding.

THE HICK'S BOILER.

The reading of the customary items was followed by the explanation of the construction of the Hick's upright boiler. The improvement sought over the ordinary upright boiler is the prevention of foaming or priming, and this object is secured by introducing a circular drum around the fire pipes for the purpose of directing the course of the ascending and descending current. The boiler received the highest commendations from the President and members of the association.

THE FIRST SUN PORTRAITS.

A statement was made in these columns a few weeks since that to Dr. Draper of this city, was due the honor of having taken the first portraits from life by photography. This assertion was disputed by Mr. Johnson who maintains that he had anticipated the doctor by nearly a year, his first sun pictures from life dating as far back as Oct. 7, 1839. The claims of this gentleman were substantiated by several members, and the subject was referred to a special committee for investigation.

NOVELTIES.

A flax-pulling machine of ingenious construction was exhibited by its inventor, who stated that throughout the West flax is very extensively grown for its seed alone, the plant, owing to the expense of pulling it by hand being so great, has hitherto been neglected, but with this machine this waste might be utilized.

Prof. Vander Weyde explained the working of a new pantograph, a beautiful instrument imported from France, designed for use in making drawings of any object near or remote with mathematical precision, either on an enlarged or diminished scale. Afterwards the professor gave an interesting and instructive lecture on

THE RELATION BETWEEN LIGHT AND SOUND.

The speaker first alluded to the terms common alike to painting and music, such as color, tone and harmony; he also likened the great painters to the best musical composers. Referring then to the connection existing in theory, he showed that in an octave of music the highest note was caused by twice the number of sound waves that produced the lowest note. So, of light; while red results from 450,000,000,000,000 vibrations of ether in a second, the number of undulations must be nearly doubled before the highest color, extreme violet, is produced. The professor then drew attention to a diagram in which the colors of the spectrum were referred to the middle notes of a piano key board in the following order.

Do	Re	Mi	Fa	Sol	La	Si
Red	Orange	Yellow	Green	Blue	Indigo	Violet
C	D	E	F	G	A	B

The primary colors it will be noticed correspond to the notes of a perfect chord. The actinic rays, which it is known increase in power beyond the violet of the spectrum, are referred to the higher notes of the piano, the calorific rays, which have their maximum heating power beyond the red ray, correspond to a third octave.

It would be contrary to good taste in dress to place the color yellow by the side of green: so the combination in music of the notes E and F produces imperfect harmony. As new colors are constantly being introduced, it seems reasonable to suppose that at some future day we shall be in possession of tints corresponding with the semi-tones in music.

The speaker then gave a brief history of music, referring to the primitive ideas of harmony and the pretentious notation of the Greeks; the simplifying of these musical names by the Romans in the substitution for them of the letters of the alphabet from A even to P and Q. The discovery of the simple octave led to the rejection of all letters beyond G, but the note B natural was for a long time unknown. As originally written, the Scottish air, "The last rose of Summer," did not contain this letter. Afterward, on the general adoption of this note by the musical world, the Germans bestowed upon it the name H, so that their musical scale as amended now reads A. H. C. D, etc.

Prof. Vander Weyde mentioned that he had divided the scale into thirty one equal parts, while Prof. Tillman considered it as composed of fifty three equal divisions.

ACID-HOLDER.—Stalba mentions that glass and porcelain vessels are protected from the action of the hydro-fluoric acid used for engraving on glass, by a coating of paraffine. Carefully dry and heat the vessel, melting some paraffine in it and turning it around so as to coat the whole interior. Why may not the same protector be useful in executing a design upon glass?

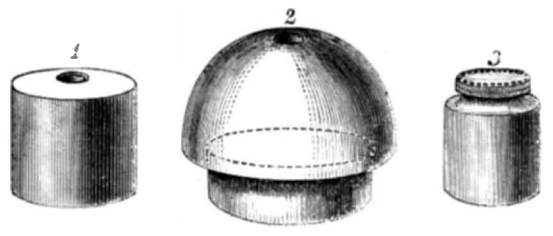
STEAM WHALING.—It is said that Dundee, Scotland, had a fleet of twelve first class whaling steamers ready to sail about the first of March for the whaling ground on the coast of Labrador. After that season is over they are to return home, discharge, coal, and repair to the whaling ground at Davis' straits. The attempt to pursue the whale by steam has been made without success, as the paddles and machinery alarm him before he can be approached near enough for harpooning.

WHAT IS IT?—The Pottsville *Standard* says that in the vicinity of Orwigsburg there exists a peculiar substance, formerly called "Orwigsburg coal," which bears some resemblance to plumbago, or black lead, and has been used for many years by carpenters and others instead of lead pencils, by merely sharpening it at the point. It makes a distinct mark, is soft, and not at all gritty.

STEAM BOILERS---THEIR FORM, CONSTRUCTION, AND MATERIAL.

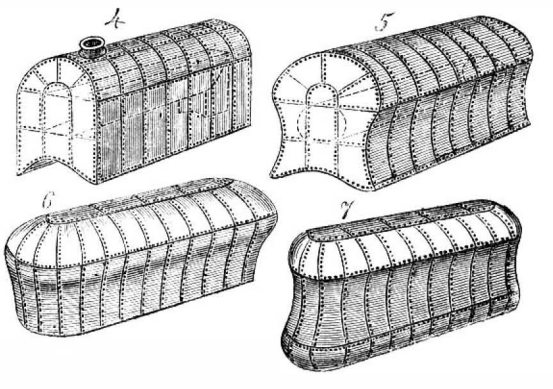
NUMBER ONE.

Under this general head we propose to present some facts, which, although well established, may not be entirely familiar to all of our readers interested in the subject of steam, its generation and application. We shall make this the subject of several articles, in which we shall treat briefly upon the different forms of boilers—boilers for stationary, marine, and locomotive engines—the different materials used; the varying modes of construction; the causes of explosions, so far as can be gathered from experiments and investigations made, and the best methods of setting and managing boilers. We desire it to be understood that we assume no originality of ideas or of treatment, but depend altogether upon the recorded experience and observations of others, our design being merely



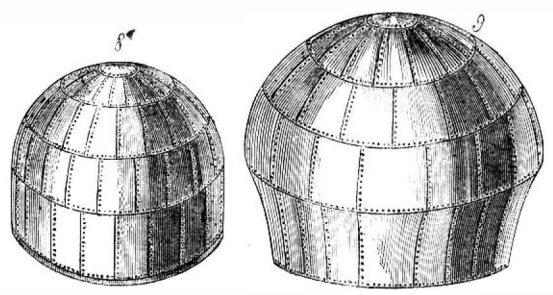
to present, in a succinct form, the most important facts already established. In these articles we shall avail ourself of the very able paper of Edward B. Marten, engineer of the Midland Steam Boiler Inspection and Assurance Company, England, and also of the records of other eminent authorities.

Probably no machine in existence has been the subject of more numerous modifications in form than the steam engine, but the changes in the shape, material, and construction of boilers have been scarcely less. It seems as though ingenuity would have become exhausted in the attempts to improve the steam boiler, the objects being to add strength, diminish

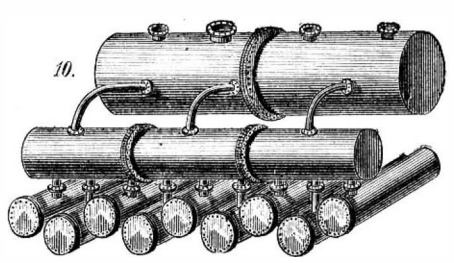


the risk of explosions, reduce the quantity of fuel in proportion to the steam generated, and to adapt the boiler to a special service or a particular location; yet new plans for boilers are continually being introduced to the public, and it will be readily seen that there is ample room for all the improvements projected, when we compare theoretical principles with actual facts.

One pound of coal if pure carbon, actually yields in the process of combustion 11,194,000 foot pounds of force, or one pound of coal burned in one hour gives a force of 5. 65 horse power. But the best coal, that nearest the state of pure car-



bon, known as anthracite, has from three to ten per cent of foreign, incombustible material in its substance. Probably some of the bituminous coals, as the cannel coal, holding hydrogen will, when in combustion the oxygen of the atmosphere unites with its hydrogen, give a greater amount of heat than pure carbon: but our theoretic calculation is sufficiently accurate. Now, we utilize only a small amount of this heat force in our best boilers, as we require from two to eight pounds of coal burned in one hour to produce a horse power. One pound of coal is capable, if all its heat is utilized, of evaporating between fourteen and fifteen pounds of water, but in practice our best results are but eight or nine pounds



of water evaporated to one pound of coal consumed. This one-third, or at least a portion of it, should be saved, and we are not too sanguine in our belief that the time is not distant when we can use the power now wasted through the inefficiency of our mechanical appliances.

Boiler explosions are not confined to modern times. Many of the boilers first used to generate steam as a motor for engines, exploded, sometimes with disastrous results. Mr. Marten says: "there is no doubt many of the earlier explosions were from faults of construction. The stronger materials now used were then found so difficult to manipulate that others easier to work were chosen, and often the shape of the boiler was only selected as the one easiest to make. The early boilers were made of copper, or even cast iron, with lead or wooden tops, and of the weakest possible shape." Such was the Savery boiler shown at No. 1, a mere cylinder, the fire being applied under the bottom, and having no internal braces whatever. Steam was then used at or below the atmospheric pressure, so that there was as much danger from the collapsing of the boiler by outside atmospheric pressure as from internal force. So little was the pressure of the steam estimated in the early stage of steam engineering that boilers were actually constructed of wood, hooped, having internal fire places, and possibly flues, of copper; and even a stone chamber was used as a shell for a boiler, having smoke flues of copper passing through it. Cast iron boilers were frequently used having an internal fire place of wrought iron and they may still be found, says Marten, in use at some of the older works in England. Others of this material but of different forms are shown in Nos. 2 and 3, the first being called the tun boiler and the other the flange boiler. These boilers, except the flange boiler, were cast in one piece and as there would be defects in the casting and very probably one side would be thinner than another the boiler would have an inherent weakness.

When wrought iron boilers first came into use the shapes were much varied and the dimensions increased. One of the earliest forms was that of the wagon boiler, seen in No. 4, having round top, plain, upright sides, and a concave bottom. This is a form illy calculated for withstanding internal pressure, especially as boilers so built had no internal stays. In most cases, says Marten, the explosions of this class of boilers tore off the bottom, owing to the angle iron round it being weakened by the alternate bending backwards and forwards under each variation of pressure, as the sides and bottom must be constantly springing when at work.

An improvement was attempted on this form by the boiler seen in No. 5, which gave greater heating surface, and by the concavity of its sides offered increased resistance to internal expanding force. Still further improvement is seen in No. 6 in which the ends and top were made convex, and in No. 7 where the bottom was made to correspond with the top and ends in convexity. This last was an approach to the cylindrical form now so generally used. All these forms, however, required a great many stays to retain them in shape, and numerous explosions proved their weakness. They generally gave way at the bottom.

The haystack and balloon boilers succeeded, some of them being twenty feet in diameter and containing so much water and steam as to make them terrible engines of destruction in case of explosion. They are seen in Nos. 8 and 9 and were extensively used. They were made as large as twelve or even fifteen feet in diameter without stays, but although the larger ones were stayed, yet many of this form of boiler were exploded, the bottom generally being blown off.

The boiler seen at No. 10 was of cast iron consisting of nine cast iron pipes, about one foot in diameter and nine feet long, set in masonry so that the flame played all around them. These tubes were connected with one of a larger size placed transversely above them forming a steam receiver, and this with still another and a larger one, making a steam chamber. This resembles in form and arrangement of parts some now made and highly valued by their constructors, only the material is of wrought instead of cast iron.

WHAT IS A PEDDLER?

MESSRS. MUNN & Co.:—I have reason for knowing that you would do many of your readers a favor by giving them a few hints upon the latest United States license law, especially its claims upon patentees and their agents. For example: if A, as a patentee, appoints B an agent for a town or county, to sell therein, not rights to make, but patented goods made by A and furnished by him to B at a discount, and B sells said goods in said territory either to merchants in quantity at a discount or to other persons at retail, is B in either or both cases a peddler in the sense of the license law? Again, if C is a manufacturer of articles patented or unpatented, and he delivers, either in person or by proxy, these articles to his customers who ordered them, one article to a customer perhaps, is C in such case a peddler? Or if he fills orders from a distance, by mail, express or otherwise, is he a peddler?

Supposing you able and willing to answer these questions readily, for the general interest of your readers, I have taken this liberty. If I have presumed too much, please excuse me.

A. M. A.

We are not appointed to expound the Internal Revenue law, and for any authoritative decision of his questions must refer A. M. A. to his district assessor, or to Commissioner Rollins at Washington. From the official instructions just issued, however, we make two extracts which may throw light on the first question:—

35. The liability of peddlers and commercial brokers to special tax depends upon the acts done, and is not affected by the fact that the party is employed by others and is acting merely as an agent.

41. Persons traveling about the country as the agents of manufacturers or dealers, *seeking orders* for goods as agents of one person or firm only, and who are paid a salary, but receive no commissions whatever, should not be required to pay tax as produce or commercial brokers.

We should say that if B keeps and sells the goods of A, whether by consignment or purchase, for commissions or for profits, at a fixed place of business, he is taxed as a merchant, wholesale or retail, according to the amount of his sales. He is not a peddler unless he "sells or offers to sell goods at re-

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tail, traveling from place to place." The large class of wholesale peddlers, carrying supplies of crackers, cigars and other specialties to country merchants, do not seem to be included under the definition; and yet the exemption in the same section, permitting certain classes of manufacturers to peddle their wares "at wholesale" [*i. e.* to be sold again] seems on the other hand to imply that *other* goods may *not* be carried about for sale to dealers without a peddler's license. Manufacturers and producers of agricultural implements, garden seeds, fruit and ornamental trees, stoves and hollow ware, brooms, wooden ware, charcoal and gunpowder, are exempt from special tax for selling their goods from place to place, at wholesale.

Again, if B, in his capacity as agent, itinerates, soliciting orders for A, but not carrying the goods to be sold, he becomes a commercial broker, provided he acts for a commission, or for different parties, and not as the simple employé of one party. If however, he sells the goods directly, from his own hands and not from A's, the above instruction 41 shows that he may send his salesman to solicit orders, and if so of course he may solicit them himself, without either a peddler's or a broker's license.

In regard to the second question, it is evident that any manufacturer may deliver goods previously ordered of him, no matter by what mode of delivery, without being a peddler. The distinction of a peddler is not that he employs his own vehicle instead of another's, but that he employs a moving vehicle to sell goods from. If C sends or carries only sold goods to those who have already purchased them, he is not a peddler, but if he should carry also spare articles for those who wish to buy them on the way, he would become one.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Action and Re-action.--The Measure of Force.

Messrs. Editors:—I wish to say a few words in reply to the strictures on my previous communication by "A Subscriber," (page 217 current volume of the Scientific American.) It seems to me that he practically begs the question, as he merely cites a precisely similar case to that already considered, calling it a *demonstration* of the disputed principle that force is measured by the space through which it is applied. My position is that there are two entirely different species of quantity to be measured. One of them I consider to be "absolute force," whether correctly or not is the point in dispute. It is measured by the number of equal increments acquired when a body is freely acted upon by a uniform force, as when gravity acts upon a falling body. In other words, in a body containing a given quantity or unit of matter, it is measured by the time the impelling force acts upon it, or what is practically the same thing, by the velocity imparted. This velocity is simply a condition of the body, indicating that it has a certain amount of force associated with it, and it is an absolute measure of that force.

The other measure is of work done or to be done, and is only a relative measure of space effect during the expenditure of force. The foot pound is a familiar unit of this kind of measure, but it can only be applied as a measure of space effects and not of the simple expenditure of force. The number of foot-pounds which a moving body is capable of raising against a uniform resisting force, undoubtedly varies as the square of its velocity, but it is far from being a logical consequence that the absolute force associated with the moving body is in the same ratio. Let us see. A body falling freely one second, acted upon by terrestrial gravity, traverses a space of 16 feet and acquires a velocity of 32 feet, just as the ball in the long gun, cited by your correspondent, is supposed by him to do. But let us suppose, in both cases, that the impelling force is entirely removed at the end of the first second and that the body continues to move freely. Its acquired velocity will carry it, without expenditure of force, 32 feet in the next second, at the end of which it will have passed over 32+16=48 feet, instead of 64 feet as it would if the force were not removed, so that the distance due to the impelling force during the last second in 16 feet, or the same as in the first second. The same reasoning will apply to any number of seconds or other units of time. Equal increments of force are therefore added in equal times, and the entire force is in proportion to the time the impelling force has acted, or to the final velocity. In the case of the gun and ball, your correspondent admits that the intensities of action and re-action are equal during each successive instant, and it inevitably follows that their entire sums must also be equal, so that the force applied is equally divided between the gun and ball, though the amount of work done, or space effect, is unequal.

Work, then, is composed of force and space, and its unit, the foot pound, is made up of both. However valuable when used in a proper manner in practical mechanics, it cannot be set up as a unit of pure force, without involving the absurdity of supposing that gravity and other uniformly acting forces do not act uniformly but with a constantly varying power dependant upon the velocity of the body acted upon, and increasing immensely with that velocity. The unit of work is just as valuable, practically, if we do not insist upon such an absurdity. We have therefore two units of measure, one being the unit of *force*, proportioned to the simple velocity, and the other a unit of *work*, proportional to the square of the velocity, or to the space traversed. All the treatises on mechanics which I have seen give the first as the measure of momentum or "quantity of motion," while the quantity measured by the latter is variously termed "vis viva," "work," "energy," "kinetic energy," etc. It seems to me however, that if our ideas upon the subject are clear and distinct, the two words force and work are fully adequate to designate the two different kinds of quantity.

The subject of this discussion seems to me to have a somewhat important bearing upon the investigation of the nature of force, in relation to which many discoveries in modern physical science seem to indicate that new and important developments are near at hand. It is moreover quite important that practical men should understand the precise nature of the difference in the two measures, as it is of the greatest importance in considering among other things, the action of steam, its expansive power, etc. While I agree of course, with your correspondent, that terrestrial gravity is an absolute force, or more strictly speaking a resultant of many forces, I do not agree with him that steam is such a force. It is matter in motion, and like all expansive vapors or gases is the result of work done in separating the atoms of which it is constituted, and in storing up "potential energy." Of course the work which is done by steam, in expending the force stored up in it, is to be measured by a unit of its own kind, a unit of work and not of force. The problem of getting all the possible work from the fuel by which steam is produced, is a very important one, and needs for its solution a clear understanding of the principles involved in this discussion, as well as of the other conditions and principles pertaining to the subject.

No particular change in the "logic of events," relative to the effect of force upon matter, has occurred since the days of Newton. His views in this respect have since been maintained by the ablest writers on the subject up to the present time with very few exceptions, and the dissenting opinions seem to refer rather to names and definitions than to facts.

Henry F. Walling.

New York, April 8, 1867.

A New Dryer for Raw Oil.

Messrs. Editors:—The process for preparing linseed oil for use in paints and the arts by boiling and the addition of siccatives, has been in use for more than a century and but little improvement, if any, has been made in the result. Chemists, as well as artizans, have overlooked an important point in the boiling of oil, which is coagulation of the albumen. This takes place at the temperature of boiling water, whereby it is changed to a semi-solid form, and when the heat is raised to the point of boiling-oil the albumen chars and when dried becomes brittle. As much of the glaze and toughness of the dried oil is dependent upon the albumen it contains, it will be readily understood that many of the troubles incident to boiled oil arise from the method of preparation.

A gentleman of Boston has been for a long time convinced that linseed oil could be made to oxidize rapidly without even heating, and thereby preserve all the properties of the oil in their natural state. This subject he has made a special study for several months, and the result is the discovery of an article which he has called "siccohast." By the addition of a small percentage of this substance to raw linseed oil in a cold state, the oil is made to dry in any desired time, from four hours up to ten days, its ordinary time. It dries with certainty and with better results, flows more evenly, and has a better gloss than boiled oil, and is more elastic and but slightly discolored. It has been thoroughly tested for outside painting during the past twelve months, and is found free from any disposition to crack, like oil that is unprepared. Paint prepared with this article sets so quickly that the wood does not have an opportunity to absorb nearly as much as of raw oil. It is in a fluid state, mixes readily with linseed oil and is perfectly harmless being made of chemicals which have no detrimental effect on the oil. A. W.

Boston, Mass.

[We hope the process above alluded to is really new and useful. It has been known for a long time that the mucilaginous matter of linseed oil may be separated without boiling. If raw oil be ground up with sulphate of lead and the milky mixture be exposed to sunlight, the sulphate of lead settles, carrying with it the foreign matter, and the oil becomes clear and has admirable drying qualities.—Eds.

Explosion of a Clock.

Messrs. Editors.—Mr. A. Bahn, a silversmith, watch and clockmaker etc. of this place, has a clock of French manufacture which he has kept in his shop as a regulator for ten years. It had an enamel face of iron or steel twelve inches diameter, steel hour, minute and second hands inclosed in a case, wood frame, glass 1-16 inch thick front and sides, 5 feet high 18 inches front 6 inches deep. On the 22d Feb., 1867 5h. 30m. P. M., thermometer 60° Fah., the enamel face of the dial burst or separated from the metal to the extent of one-eighth its surface, irregularly from the figures 8 to 12 and centrally to the axle of the hands, and otherwise cracked over the surface making an explosion similar to blasting in a well, the impression made upon Mr. B. being the crushing in of the skylight overhead of the second story occupied as a photographic gallery.

Neither the glass frame nor hands of the dial, were even injured or displaced, nor did the clock stop, particles of the enamel adhered to the glass in front of the dial.

Will you, or some of your contributors, please explain the wherefores and oblige some of your subscribers in this neck of the woods. P. W. Humphreys.

Austin, Texas, March 20, 1867.

Illuminating Gas is said to be considerably increased in power by heating it and burning it with heated air. It would not be difficult or expensive to pass gas and air pipes, or a double pipe for both, in connection with household furnaces, etc., and apply combination burners.

Hot Blast.

Mr. Crossley, manager of the Ormesby Iron Works, Eng., in the course of a series of papers in the *Chemical News*, expresses the opinion that (theoretically) the saving of fuel in the furnace by heating the blast, with its corresponding result of more and better iron, will be equivalent to four times the amount consumed in heating the blast, until a temperature of blast is reached equal to the temperature of the furnace itself. Notwithstanding other things to be considered besides temperature, he thinks that we may safely aim at much higher temperatures of blast than are at present employed. He also puts forth the following theory of a desirable furnace so far as it can be rendered practicable. The fuel to be put into the hearth by a separate shaft, so closed that no current of gas can circulate through it. The hot gases rising from the point of extreme heat at the hearth, to be ignited by an upper jet of hot blast at a certain point in their passage through the ore and limestone. By an excess of air forced through the upper tweers, the iron would probably be peroxydized near the top of the shaft, and at a lower point the mixture would be melted, and still lower down the iron would be reduced by passing through the atmosphere of carbonic oxide, and in the hearth would meet with the requisite carbon and intensity of heat, and be converted into cast iron.

Mr. Crossley believes, contrary to the received opinion, that the carbonic oxide after de-oxidizing the ore passes off as carbonic acid without a second transmutation. Hence the carbonic oxide from furnace tops is waste fuel, in excess of that utilized in de-oxidizing the iron ore. Ebelman's analyses, comfirmed by observations of his own, convince him that a higher temperature must be had for reducing carbonic acid with carbon (to carbonic oxide) than is used in reducing the iron oxide with carbonic oxide, and of course than can exist further up the shaft. He is also convinced that the calcining process peroxidizes the ore, and thus hightens the temperature and economizes the work in the furnace, at the point where the oxygen of the ore unites with the carbonic oxide.

The Herring Safe Case Decided.

In our edition of January 5th, we reported in brief the leading case of Sanborn vs. Herring *et al.*

The suit involved the question of the liability of the maker and vender of burglar-proof safes, and for the facts we refer to that edition of our paper. On that trial the Jury did not agree and were discharged.

The case was brought on again and has been on trial the past week, and has presented substantially the same facts and points of law. The questions submitted to the Jury were: 1st, Was there a warranty that the safe was burglar proof? The Jury found that there was no warranty, thus deciding absolutely for Herring & Co., and therefore did not read the other points in the case.

This decision follows the English case reported by us, and settles an important principle relating not only to the safe business but extending to the sale of all merchantable goods. Probably but few if any cases have been tried in this country since the famous Gerard Will case, that has excited a more universal interest in the legal profession. The suit was conducted by Barlow and Hyatt and Judge Edmonds, for the plaintiff, and Nash, and Gerard and H. M. Needham, for defendants.

Navigation of the Colorado.

The exploring efforts of Lieut. Ives and Major Bridger at one time appeared to have demonstrated that the most of this magnificent watercourse is forever impracticable for navigation. To Bridger, the upper channel appeared to be a continuous gorge of terrific depth, the table land being inaccessible from the river, and the waters equally inaccessible to travellers perishing with thirst on the land. Fearful cataracts and rapids by their roar frightened the approaching boat expedition out of its boats to clamber for dear life up the impassable precipice and get home by land.

Later explorations by private enterprise, 1864, appear to have deprived Lieut. Ives' examination (if not the examiner) of all credit, and by parity of reasoning to render Bridger's very questionable. The part of the river which Ives declared perfectly impracticable, has been navigated in a steamer 130 feet long, at 4 feet lower water, according to the explorers, with ease and safety. One of them, Mr. Samuel Adams, who is or was lately in Washington endeavoring to induce the Government to make a complete survey and open the river and branches if possible to the interior of Utah, states that the current for over 600 miles now navigated is only about 2½ miles per hour, except the rapids, the worst of which have a fall of four feet in 120 yards, and were ascended by the steamer *Esmeralda* in seven minutes.

From the present head of navigation, some three hundred miles (to the mouth of Green river), are yet unexplored, but are believed to present no insurmountable obstacles; for the Green is navigable thence for 350 miles.

Assuming the probability that the Colorado is, or can be made, navigable to the junction, we have some 1250 miles of water highway, open at all seasons, in a very direct course from the Pacific Ocean to the interior of the trans-Mississippi region, and intersecting the Pacific Railroad. At the mouth of the river is found a safe harbor six miles in length, for ships drawing twenty feet of water. There are now eight steamers on the river, and forty seven ships and one ocean steamer have been in the harbor at the mouth within six months. The unequaled grandeur of the scenery of this river, which penetrates the rising land through an almost horizontal cut, the sides gradually increasing in hight until they rise perpendicularly a thousand feet, will probably soon render it, if successfully opened, the favorite summer trip for invalids and tourists from East and West, going or returning by the Pacific Railroad.

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Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

STREET CROSSING AND SEWER INLET.—JOS. A. Miller, New York City.—This invention consists in a street crossing made of a series of perforated metal plates supported by a trough which inclines from the ends towards the center of the crossing, and which is provided with a pipe extending from its middle or lowest part down into the sewer in such a manner that all the water and mud which accumulates on the crossing and in the trough can be easily washed down in the sewer, and will be swept down by a copious rain without fail. Patented March 26, 1867. J. E. Stevenson, Agent, 40 Dey street, New York.

REVOLVING SHEEP-FEEDING TROUGH.—Columbus Aulls, Bridgewater, Mich.—This invention has for its object to furnish a simple and easily constructed trough for feeding grain, roots, etc., to sheep.

CLOTHES PIN.—David M. Smith, Springfield, Vt.—This invention relates to a pin for securing clothes on clothes lines. The object of the present invention is to dispense with the wire joint hitherto used for connecting the two jaws of the pin together, by substituting a wooden joint which is less expensive to apply, reducing very materially the cost of the manufacture of the pins.

HEATING ROOMS.—Samuel A. Halladay, Marrilla, N. Y.—This invention relates to the manner in which the heated gases and products of combustion are retarded and made to part with their caloric before entering the chimney.

GATE.—W. D. Armstrong and W. J. Armstrong, Harlem, Ill.—This invention has for its object to improve the construction of the gate invented by W. J. Armstrong, patented August 21, 1866, and numbered 57,482.

PURIFYING AND PREPARING GLASS ORE.—Enoch Carter, Newburgh, N. Y.—The object of this invention is to so purify and prepare the rock called glass ore—a recently discovered mineral—as to adapt it to many useful and ornamental purposes.

BALANCED STEAM VALVE.—Edwin Parker and Thomas S. Parker, Schenectady, N. Y,—This invention consists in so forming the slide valve that the steam is admitted to its inside, whereby the pressure on the upper and under sides of the valve are nearly balanced.

RESPLITTING MACHINE.—Edwin Westcott, Hudson City, N. J.—This invention relates to an improvement in the feed gear of a re-splitting machine, the feed rollers being so arranged that each pair can be moved in and out by turning a screw or other suitable means, and at the same time the connection between the feed rollers and the driving gear remains unbroken, said connection being effected by an endless screw which gears in worm wheels on the shafts of two of the feed rollers, in such a manner that the motion of said feed rollers remains unchanged whatever the position of the feed rollers may be. One jaw of the gage and one pair of feed rollers are rendered yielding by adjustable cushions placed on thin set screws, so that they can readily accommodate themselves to the varying width of the timber to be cut. The boxes of the saw arbor are so arranged that by means of a set screw the saw can be brought in an oblique position.

PEAT MACHINE.—Marvin S. Roberts, Lewiston, N. Y.—This invention relates to improvements on a machine for the manufacture of peat, secured by letters patent granted on the 15th of August, 1865.

COTTON CULTIVATOR.—Wallace & McClain, Murfreesboro, Tenn.—This invention relates to a device for cultivating cotton, and it consists in the employment of two shares arranged o operate one at each side of a row of plants, and scrape the earth therefrom, and using in connection therewith a rotary chopping wheel constructed and arranged in such a manner as to cut or thin out the plants as the machine is drawn along, the scraping and cutting or thinning out operations being performed simultaneously.

DOUBLE SHOVEL PLOW.—Jacob M. Eby, Warren, Ill.—This invention has for its object to furnish an improved double shovel plow, simple in construction, durable and cheap, and which will not be liable to weather, heat, sun crack, or break.

WASHING MACHINE.—J. S. SILLS, Cedarville, Ill.—This invention has for its object to furnish a convenient and cheap washing apparatus which may be readily attached to a wash tub, and easily removed, so that the tub can be used for other purposes if desired.

SAW SET AND GUMMER.—John Gardner, Virginia, Wis.—This invention has for its object to furnish an improved instrument for setting and gumming saws.

STOOL FOR FOR FENCE POSTS.—George Ipe, Kent, Ohio.—This invention has for its object to furnish an improved stool for fence posts, simple in construction, cheap and durable, which will not sag, and cannot be thrown up by the frost.

LOCK.—Abner S. Hardeig and Nicholas Reed, Otisville, N. Y.—This invention relates to a lock of that class commonly known as commutation locks, the operation of which depends upon the position of a series of disks which are marked on their circumference with letters or figures, and perforated with central holes and radiating slots through which the bolt slides. The bolt is composed of a bar which fits the central holes of the disks, and from which radiate arms which can be made to pass through the radiating slots of the disks, provided said disks are turned to the proper position. The disks are inclosed in a case one side of which is hinged and fastened by means of a screw which is concealed under the shackle when the device is locked. By removing the screw and opening the hinge the disks can be removed and the set of the lock changed.

FARM GATE.—Elijah C. Sears, Crystal Lake, Ill.—This invention relates to an improvement in the construction of farm gates for board fences which instead of swinging on hinges slides on rollers and guides for opening and closing.

BRACKET FOR ROOFING.—Hiram Beckwith, Grass Lake, Mich.—This invention consists in constructing from a single bar of iron a portable bracket designed for scaffolding in roofing buildings which may be used with the greatest convenience and safety.

STREET-CAR STARTER.—Thomas B, Jordan, Gloucester, N. J.—This invention relates to an improved device for starting street cars to relieve the horses of the first strain required to overcome the inertia of a standing car.

EXTENSION SCAFFOLD ELEVATOR.—Russel Loomis. Saratoga, N. Y.—This invention relates to an improved arrangement of mechanism for raising a scaffold or platform which may be applied to various useful purposes instead of a ladder, and consists in a pair of revolving disks in connection with friction rollers for opening and closing a device known as "lazy tongs" which are mounted on a portable frame moved about on wheels or in any other convenient manner.

STUFFING BOX FOR OIL WELLS.—J. B. Pettey and Jerome Fredricks, Conneaut, Ohio.—This invention relates to a stuffing box for keeping the surface water from oil wells instead of a "seed bag" now employed for that purpose.

GRAIN CLEANER.—Geo. Stevenson, Zionsville, Ind.—This invention relates to an improvement in screens or cleaners of wheat and other small grain especially designed for rubbing and scouring seed grain to free it from cockle, chess, and all other obnoxious seeds and foreign substances usually associated with and adhering to the grain causing the farmers in the Western States particularly great trouble and loss.

WAGON BRAKE.—Wiley Tash, Berlin, Ill.—This invention relates to an improvement in a wagon brake to render it self operative and consists in connecting the front axle and bolster with a sliding reach in such manner that in descending a hill the brakes or rubbers will be pressed against the hind wheels and lock or retard their movement just in proportion to the steepness of the descent and the necessity for preventing the wagon from running upon the team.

HORSE HAY RAKE.—Watson King, Springfield, Ill.—This invention relates to a device for operating a horse hay rake so that it will easily be adjusted to its work and be raised and lowered with the greatest facility, and the invention also relates to an improved manner of attaching the rake teeth to the head and also in a novel construction of the teeth

CORN PLANTER.—Wm. Hunter, Hastings, Minn.—The object of this invention is to supply the farmers in the West with a cheap and simple labor-saving implement for planting corn on the level prairie lands.

HAND LOOM.—Adam Resinberger, Brandonville, West Va.—This invention consists in erecting a post upon the cross center of a hand loom and in attaching to the said post four forked shears.

SLAT FASTENING.—Alexander Warner, Brooklyn, E. D., N. Y.—This invention relates to a device whereby slats of window blinds may be easily locked and held in any desired position by securing a bolt to one of the slats of the blind and arranging a semicircular sheet-metal plate which is attached to the frame of the blind, said plate being provided with a series of holes or recesses wherein the end of the aforesaid bolt may be held, thus securing the slats in any desired position.

CHERRY STONER.—George Geer, Galesburg, Ill.—This invention relates to a device for taking the pits or stones from the cherries leaving the pulpy portion entire or intact and which will admit of the work being done much more rapidly than by the ordinary hand process.

SMOOTHING AND POLISHING MACHINE.—S. L. Myers and George Willison, Massillion, Ohio.—This invention relates to a machine by which boards and woodwork of any description may be nicely polished and smoothed said machine being also provided with an apparatus for holding and feeding to the polishing surface such articles as spokes for wagon wheels, etc.

SHEET-METAL BOILER.—John Carroll, New York City.—The object of this invention is to so construct copper or other sheet-metal boilers such as are used in dwellings for heating water and especially that class of boilers which is stationary, arranged upon ranges and stoves, that the same may be made of sufficient strength and durability out of very thin sheet metal and that either one or both heads of the cylindrical vessel may be easily attached to or removed from the same.

HOLDER FOR CHUCH PEWS, ETC.—N. A. Wright, Prairie du Chien, Wis.—This invention relates to a device more especially intended for use in churches, halls, lecture rooms, and other public buildings and is to be applied to the back of church pews, settees, etc. This holder is intended for hats, caps, or other articles of wearing apparel, books, etc., in the pew or on such settee, etc.

SCAFFOLD.—John P. Wright, Canton Lenora P. O., Minn.—This invention consists in so constructing a scaffold that it may by means of a screw and proper gears be elevated or lowered with facility by the side of a building or any other desired place. It is peculiarly adapted to the use of builders and painters as it is portable and can be conveniently transported.

ROAD SCRAPER.—Georgh H. White, Huntington, N. Y.—This invention has for its object to furnish an improved scraper for roads by means of which the dirt may be scraped up and spread evenly over the road way or over any desired part of said roadway.

GATE.—E. R. Dobbs, Poughkeepsie, N. Y.—This invention relates to a gate, of that class which are opened automatically by a vehicle in its passage to the gate and closed automatically by the vehicle in leaving the gate after having passed through it. The object of the invention is to obtain a simple means to effect this end and one which may be economically constructed and applied and which will operate in the most efficient manner.

PARLOR SODA FOUNTAIN.—A. D. Schnackenberg, Brooklyn, N. Y.—This invention relates to a soda fountain in which the valve can be easily opened or closed and in which a very simple mechanism for operating the said valve is used.

BOLT CUTTER.—Homer H. Handy, Niles, Mich.—This invention has for its object to furnish an improved tool for cutting bolts, etc. simple in construction and reliable and effective in operation.

PULVERIZER.—J. B. Fields, Jersey City, N. J.—This invention relates to a device for crushing and pulverizing substances, reducing the same to an impalpable powder. The invention consists of a rotating hollow cylinder the inner surfaces of which is provided with a chilled cast iron or other hard substances for a crushing surface, said cylinder being provided with openings at its sides which are coverd with screens, and having within it a rotary crusher or pulverizer, the periphery of which is also of chilled cast iron or other hard substance. The crushing or pulverizing surfaces of the hollow cylinder and the crusher within it are of V-form and the former moves rather further than the latter in order to obtain a grinding action, all being so arranged that substances, however hard, such for instance as gold-bearing quartz, may be reduced or pulverized in a perfect manner.

BOILING KETTLE.—Anthony L. Whitney, Brooklyn, N. Y.—The object this invention is to so arrange a kettle for culinary purposes, that without removing the contents from the vessel in which they are held, the same may be boiled and then steamed, and kept out of the boiling water if desired.

LATCHES FOR GATES.—W. T. Wells, Decatur, Ill.—This invention consists in so hanging the latch upon the gate, that it can be adjusted to be thrown more or less into the catch or keeper provided for it, to accommodate it to the sagging of the gate.

MOP HEAD.—William A. Lewis, Springfield, Vt—This invention relates to a mop head of that class in which the movable jaw is operated by a screw. The object of the present invention is to expedite the movement of said jaw or give it a more rapid motion than hitherto, and to this end the invention consists in the application of the screws, one fixed on the end of the mop handle and the other being a tubular one provided with an internal thread to work on the fixed screw, and also provided with an external thread on which a nut connected with the movable jaw works.

HAND SEWING MACHINE.—B. W. Collier, Oxford, Mass.—This instrument is held in the hand and operated by means of handles similar to those of a pair of shears; it can be easily carried from place to place and is of simple and durable construction.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

E. H., of Ill.—We know of no better and cheaper cement for an aquarium of tin or zinc frame than one of red and white lead, equal parts, mixed to a putty-like consistency with boiled linseed oil. If the joints are brought together and secured while dry for a day it will not be affected by water.

B. and E., of Wis.—We cannot give a reply to your question as to grate surface and hight of chimney unless we know the diameter as well as the length of your boiler, and the situation of your manufactory as to the hights in its vicinity, as regards the dimensions of chimney. We intend to publish an article on setting boilers, such as you suggest, very soon.

N. J. L., of Pa.—A belt on a smooth surfaced pulley is more effective than on a rough pulley because it has adhesion to a larger surface. It is reasonable in theory and efficient in practice.

J P. H., of Mass.—The toy marbles generally used are made argely in Saxony. They are chipped into cubes from a hard calcareous stone by the hammer, and then placed in concentric furrows cut in a fixed slab of stone over which a platform of hard wood is revolved, while water is kept flowing on the stone. A very few minutes serves to give the cubes the form of perfect spheres.

J. P., of Mount Jackson.—Marble is polished by oxides of lead or tin known as "marble putty." That of tin is the best and is prepared by dissolving tin in nitro-muriatic acid, and after filtering, precipitating the oxide by ammonia. It is then collected, washed with water, and pressed dry in a cloth filter. Afterward it is broken up, dried in the air, powdered on a glass plate, and heated in a crucible to a white heat. It can be obtained, ready prepared, of any marble worker.

J. S. P., of Col.—We cannot supply the numbers of the SCIENTIFIC AMERICAN you wish.

C. E., of N. Y.—We are not acquainted with the method of producing the high polish on the fine steel work of watches. We suppose it to be by the use of crocus and rouge on the buff wheel and revolving brush or by hand, as the shape of the article demands. Probably some of our correspondents can answer the question.

T. A. M., of N. J.—If your tank is of equal diameter from end to end multiply the area of a cross section by its hight in inches and you have the square inches. Divide the product by 144 and you have the square feet. If your tank is a frustrum of a cone—larger at the bottom than the top—find the area of each end add them together and multiply by the slant hight. The area of a circle is its diameter multiplied by 3.1416. The reduction from inches and feet to gallons you can find in any hand book of mechanics or arithmetical treatise.

C. J. B., of N. Y., asks what is the extreme length, breadth, and hight above high water of the suspension bridge at Cincinnati, Ohio. We reply that the total length, including approaches from Front street, Cincinnati, Ohio, and Second street, Covington, Ky., is 2,252 feet; length of main span from center to center of towers, 1,057 feet; of each land suspension, 281 feet; width in the clear, 36 feet; hight above low water 100 feet. Our correspondent may know the difference between low and high water, and if so he will have a complete reply to his question.

T. P. H., of N. Y.—We think the largest water wheel in this country is one running at Troy, N. Y., which is over sixty feet in diameter.

D. S., of N. Y.—A "back action" engine is one in which the cross head is beyond the crank, or the crank is between the crosshead and cylinder. The object is to get long connections with a compact engine. It is in great favor for thwartship propeller-engines and is used occasionally for stationaries. It is simply one of the many modifications of the form and arrangements of engines, hardly any two of which are alike. There is no necessity of our "ventilating" so familiar a subject through our columns; most mechanics thoroughly understand it.

R. W. T., of Ky., desires to know something about the manufacture and makers of coiled springs. Coiled and spiral springs are merely wound, one of flat steel or brass and the other of round steel, iron, or brass It is a process any machinist can perform, and we are not aware that there can be any secret in the manufacture.

J. B., of S. C.—Ordinary soft solder will fasten the ribs of gun barrels without the heat necessary for brazing. Clean the barrel and rib from grease and wash with dilute muriatic acid, then tin both with solder and proceed as in soldering tin.

S. J. H., of Ill.—Crank pins or any journals of wrought iron may be faced with steel by welding a sleeve of steel over the iron with borax, or, if the work admits, boring the sleeve, turning the iron and shrinking the sleeve on.

C. M., of Col.—Packing rings for steam cylinder pistons are largely made of cast iron. We have seen them made of steel, and also of brass filled in with Babbitt metal, but we think steel packing rings are not now used. The springs are of steel. The disagreement between you and your opponent probably arises in a misunderstanding as to the terms "ring" and "spring."

J. K., of Ill.—Boulton and Watt's rule for finding the sectional area of a fly wheel per horse power is: "multiply 44,000 times the length of the stroke in feet by the square of the diameter of the cylinder in inches, and divide the product by the square of the number of revolutions per minute, multiplied by the cube of the diameter of the fly wheel in inches. The result and number will be the proper sectional area of the fly wheel rim in inches." For further particulars and examples we refer you to Bourne's Hand Book on the Steam Engine page 229. . . We cannot understand how Ebaugh's boiler annealing is applicable to multitubular boilers.

J. H., of N. Y. says, in reply to P. Y. on the "Crank Motion" in our issue of March 30th: "As the distance traveled by the four feet crank in one-half a revolution (12·58 feet, is to that of the piston (8 feet) in the same time, so is the length of the crank (4 feet) to the average leverage, (2·54) feet. J. L. F., of Ohio, says: seven tenths of the distance between center of shaft and of crank pin will give the average leverage of a crank; in this case, of a four feet crank, the distance being 33 6-10 inches, the average leverage.

G. W. T., Wheeling, W. Va.—Metaphysical and ontological disquisition lie not quite near enough to the practical interests of mankind for our purposes. Besides, they require, from their nature, a great deal of room, which is out of the question in a newspaper.

J. W. B., of Miss.—The rank and persistent odor of ordinary benzine is due to matter which is foreign to the pure article. The ordinary essential oils will easily disguise the odor of a well manufactured article. The red coloring matter of most of the preparations for the hair is extracted from alkaret roots.

D. C., of Mass.—To prepare bichromate of ammonia, add a solution of chromic acid to aqua ammonia till the odor of ammonia disappears; thus you have chromate of ammonia. Now add as much chromic acid as you have already used, and you have a solution of bichromate of ammonia. By slow evaporation you may obtain the salt in crystals.

J. S. L., of N. C.—We still consider Appleton's Cyclopedia one of the best works of the kind extant. . . . Your description of what you want is so imperfect that we cannot help you. We know of no spectacles which are at the same time adaptable to near and long sightedness.

C. T. H., of O.—There are electro platers who find it most convenient to strengthen their solutions by dissolving the metal by means of the battery. It is a very good plan when the battery can be spared for the purpose.

R. P. V., of Md.—The gases used for the lime light at the theaters of this city are condensed into wrought iron cylinders.

E. F. K., of C. W.—"Does the face of the river St. Lawrence maintain a level from its source to its outlet, if we except the perceptible declines"? Water never runs up hill. The outlet must be lower than the source. The outlet of the Mississippi is said to be further from the center of the earth than some of its sources, so that to suit the case of the Mississippi we must give a limited signification to the expression up hill. As the outlet of the St. Lawrence is northward of its source, the outlet might be a trifle lower than gravity alone would bring it.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Manufacturers of golden sulphuret of antimony for coloring rubber please address P. O. Box 397, New Brunswick, N, J.

A "subscriber" wants to know where the "Stark Mills'" bag is made, and by whom.

Manufacturers of No. 22 Brass Chain send address and price to J. Gurd & Son, London, C. W.

A. Fellows, Mayuoketa, Iowa, has a valuable patent with no means to improve it. Wishes to correspond with men of capital with a view to have them furnish means for a share. $5,000 sufficient. A splendid opportunity.

EXTENSION NOTICE.

William E. Ward, of Port Chester, N. Y., having petitioned for the extension of a patent granted to him the 28th day of December, 1852, for an improved method of heading screw blanks, rivets, etc., for seven years from the expiration of said patent, which took place on the 28th day of December, 1866,—this application having been authorized by Act of Congress,—it is ordered that the said petition be heard at the Patent Office on Monday the 24th day of June next

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Improved Automatic Lathe.

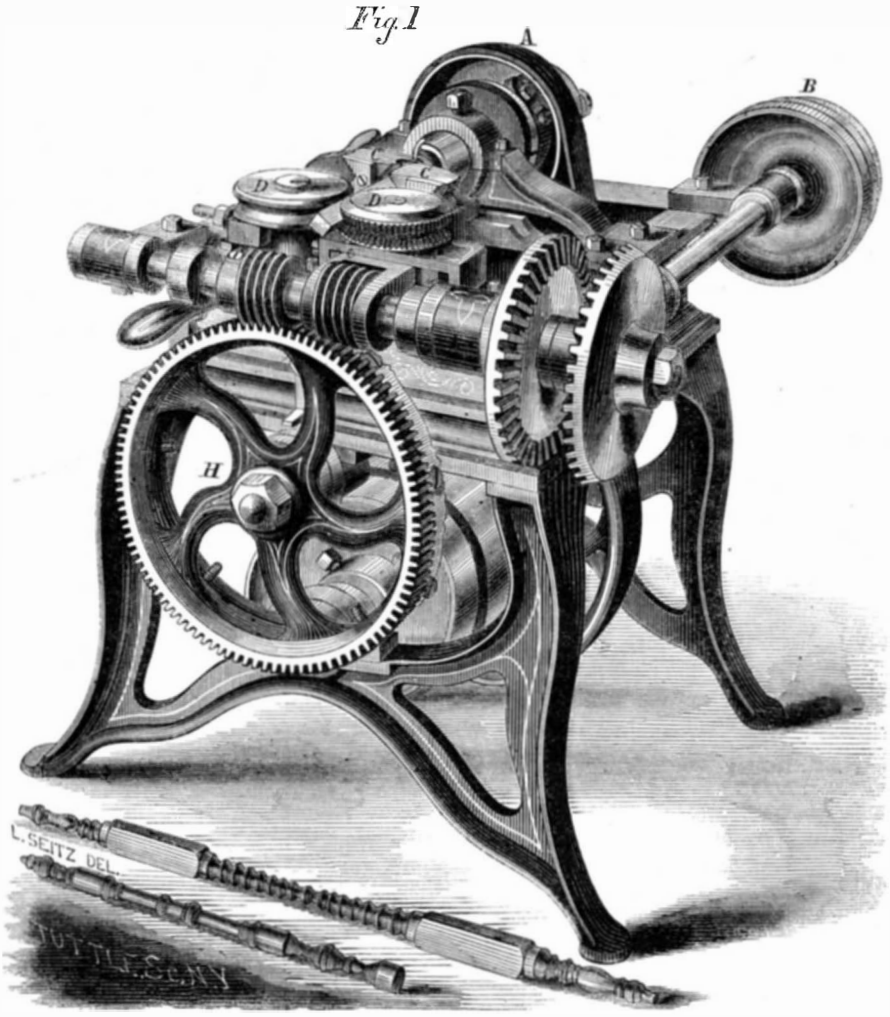
The engravings herewith given represent a very ingenious machine for turning beaded and plain wood work, for handles, chairs, settees, spokes, stair railings, and many other purposes. It is compact, direct acting, and certain in its operation. It will cut or plane in a square, octagonal, or any polygonal form, and turn plain or beaded at the same operation. Fig. 1 is a perspective view of the complete machine, and Fig. 2 the working side of the head for turning the round work.

The machine is driven by the lower shaft, which, by means of belts, gives motion to the cutter head, A, and the cone pulley, B. It also, by suitable connections, revolves the cutter heads, C. The head, A, turns loosely on a hollow arbor which is fitted with dies of different form to guide the work. In Fig. 1, the die shown is square to accommodate the square piece seen passing between the feed rollers, D, in Fig. 1. One of these rollers is toothed and the other plain. They are adjusted by springs to open or close together to admit the work to be turned, and they feed it to the heads, C, which also can be similarly adjusted. From these cutters the wood passes through the hollow stationary arbor and is turned by the cutters on the head, A. These cutters are V-shaped as seen in Fig. 2 at E. The cutters are secured by hook bolts to bell cranks, F, pivoted at the junction of the angles, and held pressed in toward the center of the wheel by springs, G. The outward movement of the cutters is assured by dogs attached to the crank levers, F, by means of slots through the pulley. These dogs connect with a lateral sliding bar, not shown, the end of which engages with the pattern plate secured to the large worm gear, H, seen in front of the machine, Fig. 1. This pattern is of sheet steel or iron, the edge formed to present a section of the work to be done, and one can be changed for another at will. The wheel carrying this pattern is driven by one of the worms on the front horizontal shaft, the other driving the feed wheels, D. This shaft is driven by the cone, B, with the aid of bevel gears, as seen, which may be thrown in or out of gear, as desired, to actuate or stop the feed rollers or the pattern wheel. This is done by a lever operating a clutch in the usual manner.

A stick may be introduced into the machine between the feed rollers, D, and pass to the cutters, C, which may be of and shape to give the form required; thence through the die in the hollow arbor until the cutters on the head, A, engage with it and turn it to any form desired, their motion to or from the center being controlled by the action of the pattern on the rod, which opens them, and the pressure of the springs, G, which close them.

This machine is the subject of a patent issued Aug. 24, 1858. A patent is also pending through this office on other improvements. For further information address Frederick Baldwin, Brattleboro, Vt.

Fig. 1



BALDWIN'S LATHE FOR TURNING ORNAMENTAL WORK.

American Iron Manufacture.

The statistics presented at the last meeting of the American Iron and Steel Association show a product for 1866, in pig iron of nearly a million (939,956) tuns; in rails, new and rerolled, of 339,764 tuns; in nails of 129,858 tuns; in castings (over 10 lbs. weight), 946,613 tuns, etc. The following is the complete table, in which the very large import strikes the eye, the native product of pig iron being overbalanced by the castings alone:—

	Tuns of 2,000 lbs.
Pig iron of all kinds	939,956
Rails, new and rerolled	339,764
Iron advanced beyond blooms, slabs and loops, but not beyond bars	184,751
Bars and rods made from iron on which a duty of $3 has been paid	23,073
Blooms, slabs and loops	14,516
Band, hoop and sheet (all sizes)	142,829
Plate iron (all sizes)	57,771
Rivets, nuts, washers and bolts	29,281
Cut nails and spikes	129,858
Castings for bridges and other prominent structures	33,309
Castings exceeding 10 lbs in weight	946,613
Stoves and hollow ware	82,605
Iron advanced beyond blooms, slabs, etc., the duty to which it was liable in the forms of blooms, slabs, etc., not having been paid	18,555
Wrought railroad chairs, etc	17,265

A comparative view of the proportion of the several states in the above product will be found interesting, as follows:—
Of the 939,956 tuns of pig iron made,

	Tuns.		Tuns.
Pennsylvania produced	197,584	Massachusetts	11,126
Ohio	118,498	Kentucky	9,723
New York	83,565	Vermont	3,743
New Jersey	29,768	Wisconsin	2,389
Maryland	27,080	Tennessee	1,171
Michigan	15,823	West Virginia	757
Connecticut	14,208	Virginia	474
Missouri	14,046		

Of the 339,764 tuns of rails there were produced in

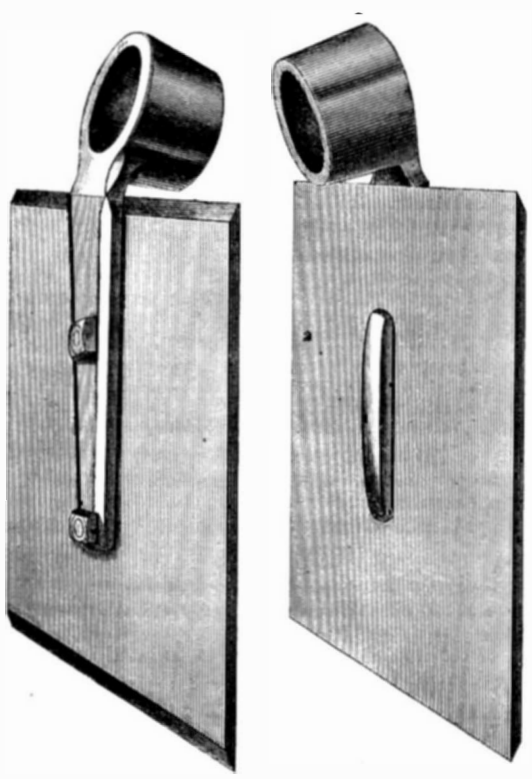
Pennsylvania	180,854	Michigan	11,003
New York	54,415	Kentucky	9,288
Illinois	47,646	New Jersey	5,023
Massachusetts	29,575	Tennessee	3,448
Ohio	26,117	Maryland	3,279
Indiana	15,93[illegible]	West Virginia	2,218

Medical Education.

Dr. McDermott, Surgeon General of Ohio, says of the candidates for army surgeons in the late war, that none but graduates of regular medical schools were admitted to examination, and yet over eighty per cent of these were rejected for incompetence. The ignorance betrayed by many of the candidates was deplorable, proving that the diploma of a medical college has ceased to be of any value as evidence of capacity. Of course this per centage does not indicate the condition of the medical profession, but only of the dregs, or at least the rawest portion of it, seeking employment for want of practice; but it proves that the title of "M. D." is worse than useless as now administered, to indicate the learned in medicine. The suggestion of Dr. Butler in the *Medical and Surgical Reporter*, commends itself strongly in this state of things. It is that the American Medic. Association should take this matter out of the hands of the multiplying and easy-going medical colleges, by appointing Examining Boards with authority to review the pretensions of all practitioners within their respective districts, and on whose report the Association shall act in according or withholding the degree of Member of the American Medical Association, as a universal substitute for the abused and worthless "M. D." Of course the cabalistic letters would be the initials of some Latin synonyon of the above title, as the letters M. A. M. A. do not spell the right designation for a regular doctor.

Rose's Reversible Hoe.

"Dull as a hoe" is an old-fashioned saw, but has hardly the force of truth in these times of improvement, when a sharp edge and a steel plate is considered so necessary to the efficiency of this agricultural implement. A dull hoe is a poor tool to work with, and if there can be two edges to a hoe so that when one is dulled the other may be in good order, something is gained in the saving of time. There have been hoes made double bladed so as to be reversed at will, but the unused side threw the other out of balance and interfered with the proper "hang" of the blade.



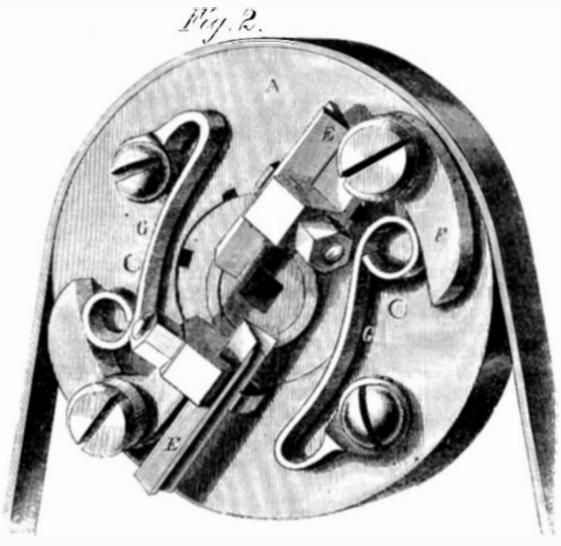
The device seen in the engraving is intended to obviate these objectionable features, and would seem to be effectual. The eye has a shank which passes part way across the blade and is secured with bolts and nuts. A strengthening piece is attached to the face of the blade which holds the bolts, and may be made a part of the blade or secured to it in any proper manner. The bolt holes are so spaced that they fit the bolts equally well when either edge is down. No further description is necessary for a proper understanding of this improvement.

It was patented through the Scientific American Patent Agency, January 1, 1867, by C. A. Rose, of Columbus, Ga. For additional particulars address Thomas G. Orwig, at 119 Nassau street, New York City.

The Cashmere or Angora Goat.

The valuable and elegant shawls imported into this country from Turkey and other localities in Asia, and often styled camel's hair shawls, are made from the wool of the Cashmere, Angora, or Thibet goat, as they are indifferently styled. Probably there is no generic difference between those bearing these separate names, the variation in their points being the result of difference in climate and cultivation. These shawls, when genuine, are held at high prices, being often estimated by thousands of dollars. Attention was first directed to them by the forwarding of one to Paris by the commander of the French expeditionary army to Egypt under the first Napoleon. A single fine shawl sometimes employs the labor of four persons for a whole year. The English obtained them from India. The best are worth at the place of production from $500 to $800. The ordinary qualities have been and still are imitated in France on the Jacquard loom. In the fine, genuine Cashmere the figures are produced in the same colors and precisely alike on both sides. Imitations of these are rarely attempted on account of their cost.

Fig. 2.



The goats were first brought to France in 1819, from thence they were introduced into England. In 1849, Dr. James B. Davis, of Columbia, S. C., procured seven females and two males of the pure Angora breed, and since then they have been largely raised in many states, especially in the West. In Ohio alone, during the past six months, at least $100,000 have been paid for these goats. The fleece of these goats is from eight to fourteen inches long, a specimen now before us, not selected, measuring over twelve inches. It cannot be called a wool, as it is mainly a mass of nearly straight, very fine hair, with a brilliant silky luster. It resembles the silk as generally imported from China and Japan, and is white or nearly so. The goats are shorn twice a year, are hardy, prolific, and in addition to the value of their fleece are excellent for the table.

This silky hair is not, however, all the material of the fleece. Next the skin is a down of wool so fine that ordinary wool is not to be compared to it. From this the delicate fabrics of Asia are produced. Fine specimens of the animal are raised in this country and sold not unfrequently at prices varying from $800 to $1,500. It appears that we have as yet no proper machinery for the manufacture of the fleece into the most valuable products. The hand process in use in Asia, where the labor costs only from three to twelve cents per day, is impossible here. Dress goods can be readily produced on our present machinery, but at considerble waste of material.

Mr. Israel S. Diehl, for many years our consul at Batavia, has been commissioned by our Government to proceed to Europe and Asia for the purpose of investigating the modes of manufacture and selecting for this country a number of the most valuable animals. The attention of our mechanics and inventors is directed to the production of suitable machinery to render more valuable this superior material of manufacture. Communications seeking information may be addressed to Charles S. Brown, President of the American National Bank, No. 80 Broadway, New York City.

Swann's Safety Valve.—In our description of this valve in No. 15, current Vol. an error occurs in the address of Messrs. Teschemacher & Stearns. It should be No. 13 Exchange street, Boston, Mass.

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VOL. XVI., No. 17....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 27, 1867.

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CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK Row, and not at No 39.

GAS METERS---WET AND DRY.

The employment of illuminating gas as an artificial light is so general throughout the country that all information relating to the subject must prove of universal interest. Especially should the construction and management of gas meters be familiar to every consumer, for its testimony is the only provision made for showing the standing relation between producer and consumer. A few weeks since we referred to the report of a committee from the Boston Common Council, appointed to investigate the gas manufacture, giving our readers some general facts on the subject gathered from the great mass of testimony therein presented. From the same source we draw the following in relation to meters:

That payment should be made by the consumer according to the amount of gas actually used, is eminently just and was recognized as such from the first general introduction of illuminating gas. The apparatus first contrived accomplished its object in a very crude and imperfect manner, and improvements have been made, from time to time, for the last fifty years, during which period perfection has been sought for two classes of instruments known as the wet and dry meters. As the older form, the construction of the water meter should first claim our attention The main principle extending through all its varied forms may be thus explained. When a number of vessels of a certain capacity—for example, 1 cubic foot—are so arranged that, without loss of gas in the interval, one after another shall be filled by the gas in passing, it follows that just as many cubic feet will have passed as there are vessels that have been filled. As usually constructed, the meter is arranged similarly to an inverted overshot water wheel, its buckets being replaced by a revolving drum having four compartments of equal and known capacities. The gas coming in at the bottom of the meter rises through the water, which occupies a little more than one-half of the drum—fills one of these chambers, by its pressure turns the wheel and escape into the upper part of the apparatus whence it is conducted as desired for supplying the burners. While one partition is rising another is being brought under the water, thus rotation is produced and the revolution of the buckets gives motion to a series of toothed wheels adjusted so as to register on the dial plates the number of cubic feet passed through. For accuracy in the instrument the water level must be perfectly preserved, for if the meter is inclined backwards it will measure in favor of the company from thirty-five to fifty per cent constantly; if tipped forward, gas is burned that is not paid for. If the meter is set with too little water originally, if it is afterward evaporated, or if drawn off by accident or fraud, the registration of the meter would be too slow and the company would be the losers. Another serious objection to the use of the wet meter is the liability of its freezing in the winter, thereby entirely shutting off the gas supply. Substituting alcohol or spirituous liquors would overcome this difficulty, but in addition to their costliness, all these liquors evaporate so readily that the change would be in the end of no permanent benefit. The ease with which fraudulent means may be employed by dishonest consumers for underestimating the amount of gas burned, and the difficulties attending the use of this meter above specified, have caused the construction of a variety of measuring instruments in which the employment of any liquid is dispensed with.

The dry meter measures the gas by the number of times that a certain bulk will fill a chamber capable of undergoing expansion and contraction by the passage of the gas. The apparatus consists of a box divided in two compartments. The gas from the main pipe enters one of these and finds its only outlet through a slot which opens into a flexible bag of leather called a diaphragm. When filled by the gas the expansion, by a suitable connection closes the inlet, at the same time a valve is opened into a second compartment outside the diaphragm into which the gas passes and by its pressure upon the diaphragm drives the contained gas through a third slot into the outlet pipe. That the supply to the burners may be uninterrupted, two or three diaphragms are employed the arrangement being such that a certain number of movements of these shall correspond to a certain amount of gas, the number of cubic feet being registered on the dial plate. The dry meter is preferable in this respect that it needs no care to be taken of it even in the coldest weather. On the score of accuracy one meter is equally as good as the other when both are new and properly adjusted, but the dry meter will continue in order much longer than the wet.

The same reliableness in working is not experienced with meters standing idle for some time as with those constantly in use, for in the former case particles of dirt and tarry matters clog the valves and the gas passes through unrecorded; loss must also accrue to the company if any rent should be made in the diaphragm. On the other hand the consumer suffers when from the action of the coal tar upon the leather the latter becomes so stiffened that a full stroke is registered when the diaphragm does not entirely fill. Instances are given when from this cause the meter of the house which had been closed during the summer months, measured too fast or against the consumer, from thirty to forty per cent. Neither class of instruments, then, are perfect and both are susceptible of vast improvement, but the dry meter is unquestionably the better one for both parties concerned, and the whole community are interested in securing the most accurate apparatus, for it is nothing in favor of a meter that it benefits the individual at the expense of the company, in this case the amount burned and not paid for being charged by the company upon the corporation and thus the individual gain is public loss.

That there is abundant room for improvement in both styles of instruments is evident and the attention of inventors is called to the existing need. When at length we have been put in possesion of a perfectly accurate instrument, one fruitful and unfailing source of grumbling on the part of careful householders will be forever removed.

A TRIAL OF CUT-OFFS.

We have received a report of the performances of two marine engines with different cut-offs, which may be interesting to marine engineers and others, the main facts of which we will briefly rehearse.

The New York and Virginia Steamship Company built, over a year ago, for their line—the vessels of which ply between New York and Richmond, Va.—two ships, each a counterpart of the other, the hulls being built by Westervelt, of New York, at the same time, from the same molds and patterns. It was designed to make them twin vessels as nearly alike as possible. The machinery of both vessels was made at the Allaire Works, New York, from the same patterns and at one and the same time, the only difference between the two engines being that one—that of the *Niagara*—had the Stevens cut-off, and that of the other—the *Saratoga*—the Winter's cut-off.

The two vessels have been running regularly for a year on the same route and engaged in the same business. These conditions appear to have been well suited for a satisfactory test of the relative value of the two cut-offs. The Stevens cut-off hardly requires an explanation, as it is so extensively used that there are few machine engineers or builders of marine engines, who do not thoroughly understand its construction and operation. It is conceded as giving excellent results. It is operated by two eccentrics on the main shaft, one to move the steam valve rock shaft and the other the exhaust, each independent of the other, thus permitting the setting of the toes and wipers on the rock shaft, so that the steam can be made to cut off at any desired part of the stroke without disturbing the exhaust motion.

The Winter variable cut-off may not be so generally known, although it is in use on a great many vessels—naval, mercantile, and pleasure yachts. It is called a "rotary cut-off," and is operated by one eccentric on the main shaft. This eccentric gives rotative motion to a shaft on which are secured four cams, two for the exhaust and two for the steam inlet valves. The motion of the steam valves is made variable by interposing between the cam and valve-lifter swinging toes which are alterable while the engine is working, so that the steam can be cut off at any point of the stroke without affecting the exhaust, which exhaust motion is so arranged that it gives the quickest possible action in lifting the valves, and retains them in an open position as long as may be desired. Thus the steam may be utilized under the ordinary amount of lead without having back pressure on the piston.

The two vessels used coal from the same heap and a strict account was kept of their performances. The result was that the *Saratoga* with the Winter cut-off, in forty round trips between the two points, going and returning, used less coal by four hundred tuns than the *Niagara* having the Stevens cut-off and made the shortest average time, beside forcing her way over the bar in the James River when the *Niagara* could not, thus saving the expense of a steam tender, and in a heavy following sea the engineer could keep the engine from hanging on the centers by allowing the steam to follow the piston to any required point of the stroke.

The trial extended through a period of over seven months, the average amount of coal burned per trip being on the *Saratoga* in round numbers, 70 tuns, and on the *Niagara* 80 tuns. It is but fair to say that both vessels improved in the economy of coal during their thirty trips, but the result shows rather favorably for the *Saratoga* with the Winter cut-off. Our engineers must draw their own conclusions.

HOW STEAMERS ARE BURNED AT SEA.

An able contribution anonymously published in a daily paper of this city, so well sums up the criminal defects common among our steam craft of all descriptions, in regard to the hazard of fire, that we need make no apology for repeating in brief the catalogue. A list of 336 American ocean and coasting steamers of every grade is printed, with their fire rates annexed, purporting to be as recorded on the books of the underwriters in the United States and Europe. Of all these only the small minority of 73 are rated "good" in point of security and provisions against fire. The other 263 are all rated "indifferent", or "insufficient."

A steam vessel becomes from the nature of the case one of the most inflammable structures in the world. Fervid heat from the furnaces dries and chars the very portions of woodwork most exposed to danger, until they are ready to take fire like tinder from a spark or the proximity of unusual heat. In such circumstances the most minute and complete precautions ought to be religiously observed, and neglect of this plain duty is the cause of nearly all marine disasters by fire. Boilers with external furnaces of brickwork should rest entirely on their standards, and the brickwork should be cased with accurately fitted plate iron, so that fire working down into cracks and crevices cannot possibly get through, and no woodwork should be allowed within one foot of them, while that directly over them should be sheathed with metal closely nailed. All boilers should be jacketed with felt or hair cushioning, else the accident of low water and overheated surface may at any time set on fire the hot and half charred wood nearest; whereas the covering of animal fiber will quickly reveal by its peculiar odor the commencement of over-heating in any part. Boilers with internal furnaces should certainly have water bottoms; otherwise openings which will at some time or other appear will deposit fire beneath, or over-heating will take place from the bottom surface. Natural draft should always be secured, and blowers be outlawed altogether. Blowers urge every spark and flame to every possible outlet, crevice or joint of door, and many steamers have been thus destroyed by them. Whenever the passenger hears the deep thrumming roar of a blower, let him mark the name of that steamer in his note book as one to be avoided in future if possible. Woodwork around boilers, steam chimneys, etc., should be well set off, sheathed with metal within, the laps upward, and *not* employed as a closet for brooms, buckets and other combustible articles. Chimney rooms should be large enough to admit the passage of a man around the chimney, and should be without floors to obstruct free ventilation of heated air. All steamers should be provided with one or more independent steam fire and bilge pumps, placed on the main deck so as to be in no case inaccessible or unmanageable in time of danger, and fitted with abundance of hose to reach all parts of deck or hold. It is stated that scarce a week passes without some vessel being saved from burning or sinking solely by the services of one of these pumps, or lost by the want of them, under circumstances where the engine pumps are from their position inadequate or powerless. Store rooms should be located away from the fire room and boilers, instead of being placed, as they often are, to utilize a space too hot for passengers, freight or anything else, except the oils and cotton waste of the engineer! All these combustibles should be kept in a room by themselves, in fixed metallic tanks, where artificial heat and light need never come, and lighted at night by a fixed light outside. Movable lamps should be entirely dispensed with in engine and fire rooms by ample provision of light from fixed lamps. Why should not these and other securities suggested by experience, be embodied in a general law and enforced upon the owners of all steam vessels?

PATENTS IN "THE DOMINION OF CANADA."

The British North American Provinces, shortly to be united together under the name of "The Dominion of Canada," are as follows:—Canada, New Brunswick and Nova Scotia. The union of these Provinces will doubtless be perfected during the present year when a general Patent Law will be passed; but whether under its stipulation foreigners non-resident in the dominion will have the privilege of obtaining patents for their inventions, is uncertain. At the present time patents are granted in Canada, only to British subjects, who must be residents in the Provinces as well as the discoverers of the invention. In New Brunswick, however, all foreigners resident or non-resident, may obtain Letters Patent for their inventions for a period of fourteen years, renewable for an additional term of seven years.

Under the act of Union all patents previously granted in each separate Province prior to the Union, will, when confederation takes place, extend over the entire dominion. We have received this information from an eminent patent soliciting firm at Montreal, and regard it as correct.

We are prepared to take out patents in New Brunswick, in anticipation of the union of that Province with the Canadas. Particulars furnished on application at this office.

Patents in Prussia.

We have received a communication from a Commission appointed to prepare a system of Patent Law and Practice for the enlarged Kingdom of Prussia. We have responded to the committee in detail, and we trust ere long to be able to announce the introduction of a Prussian patent system

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fully up to the demands of the time. In our communication we endeavored to embody the best features of our own and other systems, none being in our opinion what they should be. Prussia is a rapidly rising country, and has just at this moment a very crude and unsatisfactory patent code.

OCEAN TELEGRAPHY.

Though a hundred thousand miles would not measure the present extent of telegraphic wires that are stretched over the continents, for reasons that may be better understood hereafter, about one third of the period during which the above was constructed has been expended in completing the first project for a line across the Atlantic.

Although capitalists have invested with great courage and liberality, and doubtless every attention has been given by those connected with the practical performance of sinking a cable between the shores of Ireland and America to proposals or mechanical suggestions that would in their opinion form any auxilliary to success; still, whether means had been overlooked or otherwise, that would have led to earlier success, the work has been accomplished, according to good authority, only through the advantages of "-suitable weather," and, it may be added, the use of an enormous ship whose great gravity, particularly when heavily loaded, yields but little to the motion of an ordinary seaway ; in short, fortunate circumstances have furnished a means for the establishment of a telegraphic communication between the two continents,but at a cost that prevents its becoming of general public utility.

It is now admitted that a properly insulated wire works better, and at all times more certain, at the bottom of the ocean than those ordinarily used overland, and supposing the possibility of means being employed for submerging a cable with about the same certainty and safety that a ship can ordinarily cross the Atlantic, considering also the reduced cost of laying it as compared with that of stretching one the same distance overland, it is evident that a message could be sent between London and New York at ten shillings, as well as at ten pounds, and the enterprise be a more certain investment for capital, as the employment would in such case be more permanent. Every attempt to lay an Atlantic cable previously to the last one, has been attended with repeated obstacles, injuries, and fractures, and many experts have questioned the adaptability of the mechanical devices employed.

Should a fisherman, whose float is some distance from the end of his rod jerk up suddenly a portion of his line that may have sunk between himself and the float, the resistance of the water to the movement of the slender line will bend his pole, and the writer has in his experience broken his fishing tackle without gaining a fish.

The generality of ships are liable to pitch and tumble at sea and even the *Great Eastern* can perform a "grand swing." These movements, which are irresistible, or even a violent cross sea, aresevere on a cable of any ordinary thickness, which on the other hand is subjected in its movements frequently to some miles of friction in the water, and much of it at great depth. Being liable to the strains and tension of these contending mechanical and elementary forces and resistances, a cable needs to be paid out from some contrivance that will yield readily and neutralize their effect.

Such a contrivance was not only not used in the transatlantic cable laying expeditions, but it will be seen that a device was employed that would in a rough sea surely aid in its destruction; hence the chapter of misfortunes to cables that had been pronounced perfect, even after they were placed on shipboard.

The passage of the cable into the sea was limited in its speed by friction brakes, the action of which in the first attempts at Atlantic cable laying was controlled by a man, who, in order to compensate for or neutralize the effect of the ship's pitching, commonly eased the brake as her stern dropped between the swells, that the cable might run out freely as she rose again. And it was attributed to the probable mismanagement of the brake that the cable of 1857 was lost. (See Chief Engineer Bright's Report, Aug. 18, 1857). In subsequent undertakings an improved system of brake was employed, the action of which was controlled by a weight upon a lever that was moved back or forth to regulate the running out of the cable. This device would probably have been subject to no serious objection, had it been connected with a proper dynamometer, but the one used from first to last consisted of a dead weight of some hundreds of pounds suspended upon a few yards of the cable between two sheaves or pullies.

This inert body which was intended to indicate by its position the weight of the cable hanging upon the ship, naturally increased the liability to injury exactly in proportion to the promptness of the pitching of the vessel, and the angular direction of the cable over and under the pulleys added greatly to the above peculiar source of danger.

The tendency of this device is to cause an apparent regularity of movement, and nothing short of the parting of a cable would convince an unconscious observer that any undue strain had been imposed upon it. Hence the mystery and questionable explanations as to the many injuries to the different cables accompanied with the very common report of the beautiful working of the machinery.

So vast a destruction of property in a moment of time, as the snapping of a cable intended to span the Atlantic, has given rise to many propositions in view of greater safety, but they have related chiefly to floats, buoys, or the like or some peculiar construction of cable.

Mr. Thomas Silver, of this city, proposes a plan of paying out machinery which is a modification of one of his several descriptions of marine engine governors, possessing differential resisting features that restrain the movement of a cable, whether in paying out or hauling in from the bottom of the sea so long as is consistent with safety, and releases it when its further restraint would be injurious. The paying out is performed with a drum or winding disk of usual diameter, but of preference made of wood to avoid weight, around which the cable is wound a sufficient number of times to prevent slipping, but instead of the drum being flat and using as, heretofore, a so-called "knife," to force the coils of the cable laterally, to prevent its overwinding itself, or a duplicate drum to control its direction, the drum in the present case has a crescent or semi-circular groove into one side of which the cable is guided from where it naturally finds its way to the lower part of the crescent which prevents the possibility of overriding itself. In hauling in, the cable would of course, be guided to the opposite side of the crescent and the action would be the same as above.

The shaft on which the drum is fixed bears also a pinion, which gears into a toothed wheel having cast to it a second pinion, the latter working into a second wheel which operates against the force of a spring, or for greater security, several springs may be applied, the opposite end of said spring being connected with a friction clutch or brake that may be held to any degree of resistance considered prudent to restrain the cable. A dial is moved by the action of the spring which indicates exactly the weight of cable overboard, sustained by the brake or other device used for limiting the movement of the drum or egress of the cable. When paying out, the drum is allowed to turn only in the paying out direction, and any slack of cable that may be caused by the sudden lifting and fall of the stern of the ship, or lateral blow of a sea will be absorbed by the onward movement of the vessel. The machine will automatically adapt the proper supply of cable to the varying depths of the sea, and can be arranged for obtaining sonndings of the same.

At the stern of the vessel the cable passes over a sheave and through a tube widened laterally at the bottom and having a bearing and working on the axis of the sheave, but carrying with it when moved up and down by the laying angles at which the cable may be running out, a shaft, the opposite end of which controls the position of a pointer that indicates to the engineer in charge of the speed governer as to whether the cable is running off too slack or too taut that he may regulate the egress accordingly, and this avoids the necessity of any consideration as to the speed of the ship.

In case of hauling in the cable, steam or other power is applied to a shaft bearing a pinion that gears into the differential arrangement, and while it turns the drum and winds inward the latter will nevertheless cease its motion when the cable reaches its limited strain, or will even allow it to run out again rather than be overstrained, resuming its inward motion as soon as the cable becomes relieved, the engines in the mean time working on irrespective of the action of the drum.

It was for the want of an equivalent arrangement to this that the cable of 1865 was lost, but it is of primary importance that means are employed in paying out that may avoid causing the damages that made it hitherto requisite to haul in.

There will be ample employment for a number of transatlantic cables when they can be worked at reasonable charges, which, however, need not be expected if we are to await a streak ef good weather and the use of the *Great Eastern*. The real source of success in 1866 is probably explained by Capt. Sir James Anderson, in his response to the Chamber of Commerce, of Liverpool, in September last, when he said "they should not forget that they owed it to a Higher Power in having been favored with suitable weather, without which success could not have been achieved." A. T.

Contraction and Crystallization.

The familiar axiom that every force acts in the line of least resistance, admits of many interesting applications. Take the contraction of substances in drying or cooling. The heat which forced the particles apart or the solvent that penetrated between them, having been withdrawn, the force of cohesive attraction draws them together again. But the mass being contained within certain walls, or at least resting on a bottom to which its adjacent particles adhere, and also being confined by its own gravity, is restricted in movement, and its contraction as a whole becomes less and less effective as it proceeds, until in some directions it altogether ceases; while the contraction in the structure by the mutual approximation of particles, must go on with a perfectly uniform force at all points—supposing the structure homogeneous and uniformly affected. The result must be a separation or division into minor masses; and when we ask by what law? the answer must be "on the lines of least resistance." What are they?

Look at the bed of a dried-up pool in the clay. If the bed be of soil and mixed materials, no law of symmetry will be traceable in the cracks; but if of fine homogeneous clay, a rude hexagonal form will often be traceable in the cleavage, for miles along the roadside. Starch, being of very fine and equal quality, shrinks in drying with great regularity into minor hexagonal masses. The lines of least resistance in the rent mass evidently approximate those of the hexagon, in proportion as the mass is homogeneous and uniformly affected. In the absence of any predetermining form impressed upon the particles, we account for these hexagonal lines of cleavage by the fact that they are the shortest by which a given mass may be divided, and hence the shortest by which a given tension equal in all directions may be released. Of course the shortest line, other things being equal, is the line of least resistance.

If crystallization uniformly produced hexagonal forms, we should be likely to conclude that this simple application of the most obvious line of least resistance, explained the whole mystery of crystallization. It seems evident that *planes* of cleavage characterize all forms of crystals, in obedience to the line of least or less resistance.

Why those planes should be of so much greater aggregate area in proportion to the subdivision effected, in some substances than in others, remains a mystery. The subdivision is effected in regular planes by a shorter aggregate of clefts than could be made in curves or irregular fractures, and thus the regularity and angularity of form are accounted for. But the causes that determine the selection of square, hexagonal, or octohedral forms, differing greatly from each other in extent of surface for the same mass, must be sought in some inherent property of the substance characterized by each form of crystal. Possibly the planes are multiplied by the greater gravitating force or freedom of particles, tending to approximate the spherical form, with modifications, however, from the differing rates of contraction in the mass, fixing the form in some substances when less matured, in others when more.

Death of an Inventor.

We regret to announce the death of William Bullock, of Pennsylvania, well known as the inventor of the Bullock newspaper press, by which both sides of the sheet are simultaneously printed. His death was the result of an accident. A few days ago while superintending the adjustment of one of his new machines at the *Ledger* office, Philadelphia, his foot was crushed by a belt. Amputation became necessary, with fatal result.

Mr. Bullock was one of the most ingenious, enthusiastic, and industrious of inventors. After years of laborious toil, struggling with many difficulties, he had succeeded in perfecting his printing machinery, and almost in revolutionizing the art of newspaper printing. His machines have for some time been in use in the *Inquirer* office in Philadelphia, and *The Sun* office New York. His new machinery for the Philadelphia *Ledger* is described as a marvel of beautiful workmanship.

The problem of printing both sides of the newspaper sheet at once, rapidly and well, has been many times attempted, but we believe that to Mr. Bullock belongs the credit of producing the really successful machine. Its work is from 15,000 to 20,000 sheets per hour, printed on both sides, and hence cheaper as well as more rapid work than can be down on one press of any other kind.

Coloration of Glass by Sunlight.

Mr. Thomas Gaffield, at a recent meeting of the Massachusetts Institute of Technology, made a communication on the action of sunlight in changing the color of window glass, giving the results of experiments now extending over more than three years. Isolated cases of such change had long been known, but they were attributed to some defect in the manufacture. His recent experiments confirm his first results, viz., that almost all kinds of plate, crown, and sheet glass undergo a change of color from the influence of the sunlight, the white glass becoming first yellowish, then brownish, and then pink. That the color permeates the body of the glass, and is not confined to the surface, nor produced by reflection therefrom, has been proved by grinding off about one sixteenth of an inch from both surfaces, and the four edges of a duplicate exposed specimen, which, after repolishing, exhibited the same color. Really colored glasses, so manufactured, as far as his experiments go, do not change except in the purplish tints becoming darker.

The cause of the change has been referred to the presence of oxide of manganese, the oxide of iron, sulphur, etc. He thinks it is due to the presence of oxide of manganese, which is used to give glass a white color. If the materials were pure this substance would be unnecessary, and the change would not occur; the glass made from the very pure Berkshire sand very seldom changes. No change is observed in lead glass, unless manganese is present. This change must not be confounded with what is called "rust" in glass, which is a mere mechanical disintergration of the surface, from the washing out by the rain of the soda contained in the glass. He exhibited an extensive series of specimens, showing the effect of exposure, to be seen for periods varying from one month to more than three years. Fuller details on this interesting subject will be found in the next number of the *American Journal of Science and Arts*. K.

A Chemical Theory of Cell Formation.

Dr. C. Montgomery has written a very remarkable paper, read before the Royal Society, December 20, 1866, on the above subject. The whole paper has a very particular interest, and his facts are well worth verifying by all who have an opportunity of doing so. From preliminary observations rationally treated, the above gentleman made the following experiments: A viscid substance was required, and myeline, after a long search, was found to be the one. When to myeline in its dry amorphous state water was added, slender tubes were seen to shoot forth from all free margins, being sometimes wonderfully like nerve tubes in appearance, flexible and plastic. From this crystallization was inferred, and this extension was prevented by an intimate admixture with the white of an egg; clear globules resulted from imbibition by a viscid substance. By further extensions of this observation and similar ones, globules with lively molecular movement were found. A typical cell with nucleus, and even nucleolus, and the "white margin so often mistaken for a cell wall, was always present." This latter fact will be a decisive answer to Mohl's theories. Mother cells were formed. Lastly, globules were obtained with another inclosed smaller globule, and this was sometimes multiple, like the typical pus cell. If, instead of water, serum be added to the thinly-spread myeline, bi-concave disks will form, only generally much larger than blood corpuscles. The changes in theory effected by these precise facts will, of course, be very great. The author observes that 'cells' being thus merely the physical result of chemical changes, they can no longer afford a last retreat to those specific forces called vital.—*Chemical News.*

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ISSUED FROM THE U. S. PATENT OFFICE,

FOR THE WEEK ENDING APRIL 9, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

63,603.—ANIMAL TRAP.—H. L. Anderson, Smithville, Ind.

First, I claim the revolving box provided with two platforms so arranged that in each semi-revolution of the box an inverted action of the platforms take place causing the trap to be again set in the same position as before.

Second, The employment of rod, s, and triggers, M M, so arranged that the animal in trapping himself, forces said rod back leaving it in position to reset the trap upon each semi-revolution of the box.

63,604.—POTATO DIGGING MACHINE.—O. W. Baldwin, and F. H. Pope, Greenfield, Ohio.

First, We claim the concave digger, in combination with the rotating endless slated apron or separator, all constructed and operating substantially as described.

Second, The rotating separator, in combination with the digger and shaker, all constructed, arranged and operating substantially as described.

Third, The slotted rake, E, in combination with the digger, and the mechanism by which the peculiar motion of said rake is given to it, by means of the driving wheels.

Fourth, We also claim hinging the digger, the separator, and the shaker, all upon one pivot at the rear, so that all may be elevated and depressed together, substantially as shown and described.

Fifth, We also claim the rock frame, F, in combination with the digger for the purpose of elevating and depressing the latter, substantially as described.

Sixth, In combination with rock frame, F, for elevating and depressing the digger, we claim a drivers seat so located that the driver can operate said frame by his feet, substantially as described.

63,605.—CARTRIDGE EJECTOR FOR BREECH-LOADING FIREARMS.—C. H. Ballard, Worcester, Mass.

I claim the shell extractor consisting of one piece, c, notched at its one end, substantially as specified to gear with a fixed pin or stop, e, and having its other end beveled, to cause it to protrude and recede by the swinging motion of the barrel on its pivot, a, substantially as specified

63,606.—STRAW CUTTER.—William A. Bickle and Robert Chestnut, Richmond, Ind.

First, We claim the combination and arrangement, substantially as set forth, of the cutting and feeding mechanism of a straw cutter having a straight or curved serrated knife, L, and adjustable feed rollers, C and C.'

Second, The combination of the shaft, pitman, H T-formed lever, G, and feed rods, E and F, with the ratchet wheels, D and D', substantially as and for the purpose set forth.

Third, The combination of the springs, M, roller, C ratchet, D, and feed rod, F, hinged to the lever, G, substantially as and for the purpose set forth.

63,607.—SEWING MACHINE FOR SOLING BOOTS AND SHOES.—Franklin H. Brown, Chicago, Ill.

First, I claim the combination of the punch, g, with the lever, B when constructed and operating to force the thread through the leather, after being paid out by said lever, substantially as and for the purpose set forth.

Second, The arrangement and combination of the lever, B, with the cylinder head, G, spring, s, and punch, g, the whole operating substantially as set forth.

Third, The lever, B, when applied and operating to pay out the thread as set forth.

Fourth, In combination with the lever, B, applied and operated as and for the purpose set forth, the screw, 12, for adjusting its extent of vibration.

63,608.— HORSE HAY-FORK.— J. S. Brown and William Frank Browne, Washington, D. C.

We claim sharpening the upper edges, f f, of the tripping bar in combination with the shoulders, C C, substantially as described, for the purpose herein specified.

We also claim the combined construction and arrangement of the hook, B, and pulley, I, located in and closing the mouth of the hook, substantially as and for the purpose herein specified.

We also claim the combination of the elevator substantially as herein described, and a noose band, L, substantially as and for the purpose herein specified.

63,609.—JOURNAL BOX AND BEARING.—James B. Caryl, Candor, N. Y.

First, I claim the journal box, B, having the rollers, R, arranged as shown in combination with the balls, D, mounted in the ring, H, and arranged to operate in the grooves in the end of the box and collar, C, substantially as shown and described.

Second, I claim providing the inner end of the box, B, with the circumferential groove, n, and arranging the flange. t, of the collar, C, to project over the same, substantially as shown and described.

63,610.—PLOW.—Rainsford Cantelon, Montgomery, Ala.

I claim the rim wheel, A, constructed in the manner herein represented, or in any other manner, substantially the same when used with the necessary devices for forming a plow as is herein specified.

63,611.—METHOD OF CASTING TYPE ON PRINTING WHEELS.—Dexter H. Chamberlain, West Roxbury, Mass.

I claim, First, The movable mold sections, C, in combination with the mold block, B, whereby impressions may be cast upon the perimeter of a circular disk or wheel or the surface of a cylinder, substantially as set forth.

Second, The mold block, B, provided with recesses for the reception of the mold sections, substantially as specified.

Third, I claim confining the mold section in place by means of a divided ring in combination with a spring or springs as and for the purpose specified

63,612.— MACHINE FOR DIGGING POTATOES.—Albert F. Chandler, Winthrop, Me.

I claim the improved machine for digging potatoes consisting of the chute, B, with its ploughshare or pointer and the sifter or grid, C, applied to the beam, A, and operated by the mechanism before described, consisting of the shaft, D, beveled pinion and gear hand, E, and driving wheel, F, substantially in manner and to operate as before described.

I also claim applying the adjustable standards or bearings g and f' to the beam, A, in manner and for the purpose essentially as set forth.

I also claim combining with the beam, A, the tubular chute, B, as and for the purpose as explained.

63,613.—CONNECTING TELEGRAPH STATIONS.—Stephen Chester, New York City.

I claim, First, The arrangement of several telegraph lines each in connection with magnets and batteries and converging to a common center by which the several lines and several batteries may be united as one line and one battery, or as distinct lines, and distinct batteries, or combinations thereof by the operation of any one or more of said lines without the presence of any one to control or direct the movements at the common center, substantially as described.

Second The application of such connecters that when one or more of several lines forming one line or circuit, has been cut out of the general circuit by reason of breaks existing, and a new circuit embracing the remaining lines has been formed, that said broken lines being restored to continuity in themselves, will instantly resume their normal position in the general circuit without disturbing the normal condition of the remainder of the lines and without the presence of any one at the point where the several lines are connected together to direct or control the movements.

63,614.—HEAD BLOCK FOR SAW MILL.—Gilbert H. Clemens (assignor to himself and John C. Crane), Cincinnati, Ohio.

I claim, First, The manner of constructing, supporting, and adjusting the upper saw of a circular saw mill by the use of a hinged frame, L N, pinions, H H', racks, G G', and nuts, J J', as also the use of the set screws, P P', in combination with the above, and for the purposes set forth.

Second, The upper saw arbor, provided with a single V-shaped collar, d, in combination with the recesses, d' d'', in both the bearing and cap.

Third, The use of the oblique teeth, in combination with the construction of a rack and pinion for the specified purpose of circular saw mills only.

Fourth, The bearing rollers, 2 2', formed with conical ends and screw-thread periphery in part only, for the specified uses herein mentioned.

Fifth, The roller housing, 3, as constructed in combination with the rod, making part of mill frame, as also the set screws, 4, all to operate in the manner and for the purposes set forth.

Sixth, The vertical vibrating frame, V, lever, Z, pivoted to the bridge, U, as also the pulleys, W W', and pulleys, S s and T, all in combination with each other, for the purpose of feeding and reversing the log carriage, as explained.

Seventh, The log-carriage side, formed of the metal tubular couplings, 7, as also the cylindrical sections of timber, 6, united together by a series of bolts, 13, and eyes, 14, the tubular couplings constituting the housings for the supporting truck wheels, substantially as described.

Eighth, The construction and application of the perforated tubular axle, 10, oil feeder, 11, and supporting wheel, 8, all in combination with each other, substantially as described.

Ninth, The tubular form of head blocks, 16 16', when provided with the partially concave flanged supports, 17, underneath, and the V-shaped projections, 18, and continuous slot on top, as also a series of indentations upon one or both sides of same, constructed in combination with each other, and for the purposes set forth.

Tenth, The adjustable knee, 20, and circular arc, 21, when hinged to the base, 19, and guided by the counter arc, 22, and held in position by the pin, 23, and provided with anti-friction rollers to operate in conjunction with each other for the purposes as substantially described.

Eleventh, The combined arrangement of the setting screw, 28, ratchet wheels, 30, pawls, 31, lever, 32, counterbalances, 34 35, and connecting rod, 33, constructed and operating substantially as and for the purpose set forth.

Twelfth, The application of the tappet, 36, secured to the rod, 33, also, the roller set, set in suitable housing, and stationed in position to produce a simultaneous and automatic setting forward of the knees, substantially as set forth.

Thirteenth, The use of the adjustable intermediate support, in combination with and for the purposes set forth in the foregoing claims.

63,615.—HAND SEWING MACHINE.—B. W. Collier, Oxford, Miss.

I claim the combination of the levers, A A' B B, case, C, arm, D, needle, H, rotary looper, E, hook, E', bobbin, F, pinion, L, cog, M, rod, N, spring, O, and spool, I, all arranged as herein described for the purpose specified.

63,616.—WINDOW FRAME.—Charles Croley, Dayton, Ohio.

I claim the pocket piece, D, having the catch, e, or its equivalent, and its arrangement with reference to the window frame, A, and sash, B and C, in the manner substantially as and for the purpose described.

63,617.—DOUGH TRAY.—Joseph G. Denins, Camden, Ohio.

I claim the tray, A, provided with a metallic bottom, in combination with the damper, E, and firebox, B, as and for the object explained.

63,618.—COATING WOOD.—P. S. Devlan, Jersey City, N. J.

I claim the coating of wood with the compound of silicate and vegetable fiber, substantially as and for the purpose specified.

63,619.—AIR AND GAS ENGINE.—David Dick, Meadville, Pa.

I claim, First, A generator for heating the air for an air engine by burning a combustible material contained in a close chamber connected with the generator, substantially as described.

Second, A mechanism, substantially such as described, for alternately producing and extinguishing combustion in the generator of an air engine.

Third, The combination of the section, C, of the generator, with the tube, L, and shaft, G', substantially as described, to alternately transfer the combustible material from the closed chamber to the generator, as set forth.

Fourth, A mechanism, substantially such as described, for simultaneously expelling the products of combustion from the generator and introducing fresh air therein.

Fifth, The combination of the stationary diaphragm, O, with the rotating partition plate, Q, and generator, A, substantially as and for the purpose set forth.

Sixth, The igniting tube, H, combined with its piston, I, substantially as and for the purpose set forth.

Seventh, The combination of the igniting tube with the generator and closed chamber, substantially in the manner and for the purpose described.

63,620.—BOAT DETACHING TACKLE.—William C. Dodge, Washington, D. C.

I claim, First, A boat-detaching device consisting of two locking points or bolts connected by a rigid sliding bar, and having no loose or working joints between said locking points, arranged to operate in combination with the eye-blocks, E, substantially as described.

Second, The sliding bar, B, having its rear end bent as shown in fig. 4, for the purpose of enabling both ends to be disengaged from the eye blocks simultaneously by a single movement, substantially as described.

Third, The combination of the sliding bar, B, with the spar, H, or its equivalent, when arranged for joint operation, as and for the purpose herein set forth.

63,621.—CURTAIN FIXTURE.—Edward Doen, New Britain, Conn.

I claim the combination of the glass or porcelain festoon prong knob, d, with the ratchet or holding plate, D, as and for the purpose described.

63,622.—POWER LOOMS.—John Earnshaw, Providence, R. I.

I claim, First, An eye-pointed filling thread carrier in combination with mechanism for carrying an interlocking selvedge thread, substantially as set forty.

Second, In combination with an eye-pointed filling thread carrier and mechanism for carrying an interlocking selvedge thread, I claim the reed, substantially as described.

Third, The spring, f, arranged to operate the eye-pointed filling thread carrier, substantially as described.

Fourth, The within-described method of weaving by passing a doubled thread of filling between the warp threads, locking the filling by an independent selvedge thread crossing the warps and binding, and beating up the filling, substantially as set forth.

Fifth, The shuttle, e, operating in a vertical plane, and crossing the head of the filling thread carrier transversely, substantially as set forth.

Sixth, The vibrating arm, n, which actuates the shuttle, in combination with the arm, j, and lever or cam, i, for operating it, substantially as described.

Seventh, The notch or recess, l, in the shuttle race, for supporting or steadying the filling thread carrier when the shuttle is passing through the loop of the filling thread, substantially as described.

Eighth, Providing the eye-pointed filling thread carrier with a notch, m, as and for the purpose set forth.

Ninth, The combination of the needle stock, D, with guides, a a, substantially as and for the purpose set forth.

Tenth, Forming the eye in the needle, substantially as and for the purpose set forth.

63,623.—COTTON PLANTER.—Joseph L. A. Edwards, New Orleans, La.

I claim the employment of the roller, B, in connection with the separate parts, substantially as and for the purpose set forth.

Second, The arrangement of the holes on the drum wheel, I, and the arrangement of the wheels, substantially as and for the purposes set forth.

Third, The combination of the harrow, C, the groover, F, the seed box, G, and the scraper or coverer, O, as also the agitator, K, and brush, N, substantially as for the purpose set forth.

Fourth, The arrangement of the above devices above claimed, all connected and operating substantially as for the purposes described.

63,624.—SWITCH CHAIR.—S. T. Emerson (assignor to himself and J. B. Edams), Amboy, Ill.

First, I claim the shape of the bottom of the switch chair, viz., that portion of it that comes in contact with the cross tie or head block, said shape being a surface inclined from either end down to a given point half way between the ends, and not parallel to the face of the chair, and the planes of the bottom being slightly concave from either side to a joint half way between the sides, substantially as herein described and specified.

Second, The switch chair, with a bottom as described, in combination with india-rubber seat, as herein described.

63,625.—PIN FOR THE ATTACHMENT OF BOWS AND ROSETTES.—Lavinia H. Foy, Worcester, Mass.

I claim an improved article of manufacture in a bow and rosette pin, constructed substantially as shown and described.

63,626.—SPRING BACK FOR BOOKS.—Lewis Francis (assignor to himself and Cyrus H. Loutrel), New York City.

I claim the mode substantially as described of making spring backs for blank books.

Second, I claim as a new and useful article of manufacture a spring back for blank books, when the same shall be constructed substantially as described.

63,627.—MEDICAL COMPOUND.—Obadiah V. Garnett, Versailles, Ky.

I claim the combination of the medicines in the compound herein set forth.

63,628.—MODE OF MORTISING HUBS OF WAGON WHEELS AND THE TENONS OF SPOKES TO FIT THE HUB.—David B. Goervy, Birmingham, Pa.

I claim corrugating the tenon of spokes of wheels, and bracing and uniting the end of said tenons in their mortise, so as to form a solid part of hub as herein described, and for the purpose set forth.

63,629.—FRUIT BOX.—H. H. Gridley, Auburn, N. Y., and Mary L. Gridley, Burlington, N. J.

We claim the joining of the ends of the shell by hooking them together, as shown, and introducing a slide key or other equivalent device, as described, to assist in keeping said ends firmly together.

Also, securing the bottom in its place by means of projections on the inside of the shell, formed from the material thereof, either above or below the bottom, or both above and below.

Also, the shrinking of the wet or green shell upon the dry bottom, when in combination with the above devices.

63,630.—CHEESE VAT.—L. C. Hains, Bedford, Ohio.

I claim the arrangement of a vat heater in sections, A B, and central flue, C, provided with the damper, D, as and for the purpose specified.

Second, The sliding dampers, H, in combination with the flue, C, damper, D, and fire box, B. as and for the purposes set forth.

63,631.—LOOM FOR WEAVING PILED FABRICS.—William G, Hartley, Saxonville, Mass.

I claim a bill or guard finger, 21, provided with a slit or opening forming two cutting edges when employed in connection with a circular revolving knife, w', substantially as and for the purpose set forth.

I also claim the within described arrangement and combination of the mechanism for operating the knife. w', consisting of the shaft, Q', crank, o', connecting rods, R', and Y', upright lever, S', pulleys, V' W', drum, 20, and bevel wheels, 16 and 17, substantially as and for the purpose set forth.

63,632.—CHURN POWER.—Joseph V. Hartman, Marathon, Ohio.

I claim the dash handles, G G', levers, F F', links, E E', bar, D, and pendulums, C, arranged and operated as above described, and for the purpose set forth.

63,633.—PHOTOGRAPHIC CAMERA STAND.—John Haworth, Frankford, Penn.

First, I claim the combination of the board, I, uprights, c c, ratchets, E E, pawls, F F, pillar, A, the several parts being constructed and arranged in relation to each other, substantially as described, and for the purpose specified.

Second, The combination and arrangement of the spring, G, and lever, H, with the pawls, F F, substantially as and for the purposes set forth.

63,634.—HORSE HAY-FORK.—G. W. Heath, Burlington, Pa.

I claim the arrangement of the adjustable link, B, in combination with the short arm, A, lever, C, and bar, D, in the manner and for the purpose shown and described.

I also claim providing the upper end of the short arm, A, of the fork with a series of two or more perforations in the manner and for the purpose described.

63,635.—CHECK REIN.—Thomas Heaton, Cornwall, N. Y.

First, I claim the arrangement of the check rein, main rein, and loop, C, in the manner described, for the purpose specified.

Second, The main reins, B, provided with loops, f, in combination with the check rein, A, whereby the latter can be removed and applied at pleasure, and adapted to an ordinary rein in the manner as and for the purpose specified.

63,636.—VENT PLUG.—Thomas R. Hicks, New Britain, Conn.

I claim as a new article of manufacture, a spring pressure vent plug, constructed substantially as and for the purpose described.

63,637.—ROLLING MILL.—William W. Howell (assignor to himself and M. Marshall), Philadelphia, Pa.

I claim the combination of the recessed roller, B, roller, A, shields, E, and springs, a, the whole being arranged and operating as described.

63,638.—STEAM ENGINE.—Lafayette Huntoon, Milford, Mass.

First, I claim the combination with the steam cylinders, of the steam chest and valve and ports for conducting the steam to and from the said cylinders, under the arrangement herein specified, so that but one valve and steam chest need be employed with the said cylinders as set forth.

Second, I claim the arrangement of the herein described mechanism for operating the valve, the same consisting of the rocker shaft, S, vibrating recessed arm, R, connecting rod, U, with its dove-tail stud, b, and the rocker shaft, W, with its crank, V, and finger, Z, the said mechanism being connected with the eccentric rod, Q, substantially as and for the purpose set forth.

63,639.—CHURN.—George W. Hurst, Chestertown, Md.

I claim the upright square shaft, D, with its square dasher, J, with oblique apertures, K, with extended arms, H, and atmospheric tubes, E, and valves, G, when arranged, constructed and combined, as herein described, and for the purpose set forth.

63,640.—RAILROAD RAIL.—Isaac B. Hymer, Warsaw, Ind.

I claim the rail, D, having a dovetailed tenon clasped between the side plates, B B, which are supported against and upon the bed rail, A, substantially as described and represented.

63,641.—BEEHIVE.—Zalmon L. Jacobs, Hebron, Conn.

First, I claim the narrow board, C, in combination with the board, D, substantially as and for the purpose specified.

Second, I claim constructing and arranging the hooks, O, so as to connect with each other directly or without intermediate staples or pins, substantially as and for the purpose described.

Third, I claim, in combination with the frames, L, the employment of the extensible hooks, O, when the same are made extensible by means of coils, Q, or their equivalents, substantially as and for the purpose described.

Fourth, I claim the combination and arrangement of the reversible box, s, the cloth, V, and the receptacle, U, substantially as described, and for the purpose of feeding bees.

Fifth, I claim the adjustable or changeable appendages, c, in combination with the case, A, or its equivalent, substantially as and for the purpose described.

63,642.—BUTTON.—John Jenk, Washington, D. C.

I claim the diaphragm, f, confined in the head of a button, substantially as described and employed in connection with the shouldered shank, a, and disk or fixed piece, b, in the manner and for the purpose set forth.

63,643.—HAND SEED-PLANTER.—G. Herva Jones, Rockford, Ill.

First, The combination of two single hand seed-planters, for joint operation, by means of the fulcrum link or cross bar, and the adjustable hinge, arranged and operating as described.

Second, The combination of the thrusting handles, with the slotted hinge and adjusting screws, when constructed and arranged as described.

Third, The hings, constructed of two leaves, each the counterpart of the other, and united by interlocking the hooks and eyes, for the purpose of dispensing with a pivot-pin, and of securing economy of construction, as set forth.

63,644. —WASHING MACHINE. —Eleazer Marble, Hanover Wis.

I claim the combination and arrangement of the two series of corrugated rollers, E and F, with the adjustable pendulum bars, P, substantially as and for the purposes set forth.

63,645.—CARPENTER'S BENCH.—Alden B. Marshall, Medfield, Mass.

First, The application to a carpenter's horse of a tool box, so as to admit of its being adjusted lengthwise or crosswise to the said horse, or detached therefrom, the said box being constructed and arranged substantially as shown for the purpose herein set forth.

Second, I also claim securing the legs of the horse to its body by means of the elastic bands or their equivalents, substantially as hereinbefore explained.

63,646.—HEATING STOVE.—John Martino, Jacob Beesley, and John Currie (assignors to Stuart Peterson & Co.), Philadelphia, Pa.

We claim the cast iron body, B, of the stove, the upper portion of which has a number of inclined flat sides, and the lower portion of which is cylindrical, in combination with the ring or ledge, W, and with the cap, F, cylindrical casing, H, oven chamber, K, and flues, L and J, the whole being arranged substantially as and for the purpose described.

63,647.—CULTIVATOR TEETH.—Don C. Matteson and T. P. Williamson, Stockton, Cal.

First, we claim the double-pointed adjustable bit, A, and the beveled foot of the curved standard, C, resting on the said bit in combination with the double mold board or shovel, B, the same fitting over the standard and bit, substantially as described, for the purpose specified.

Second, The oblong blade or share, D, in combination with the manner of fastening the teeth together by bolts passing through the mold board bit or share, substantially as described.

63,648.—PRESSURE GAGE.—John Mathews, Jr., New York City.

I claim the corrugated disk made more sensitive or capable of greater action on one side of its axial line than on the opposite side thereof, by giving a varied or unequal construction to the corrugations substantially as and for the purpose or purposes specified.

63,649.—CHECK ON CAR CONDUCTOR.—Patrick Francis Milligan, Washington, D. C.

I claim the employment in a car or other similar vehicle, of the checks or tickets, C, check box, B, drawer, D, and tubes, a b, when constructed and arranged substantially as and for the purpose specified.

63,650.—STOP JOINTED MANURE DRAG.—Simon B. Minnich, Landisville, Penn., assignor to himself and H. K. Burkholder, Lancaster County, Pa.

I claim the arrangement of the notched lever, E F X, with the stop, g, on the jointed hook, G K, in combination with the box, H I, constructed and operating in the manner specified for the purpose set forth.

63,651.— ANIMAL TRAP. — William Morris, Elkhart City, Ill.

First, I claim the combination of the revolving wings, B, the coiled spring, D, or its equivalent, the oscillating platform, E, latch, F, and catch, G.

Second, The combination of the latch, F, the detent, H, and guide plate, I, substantially as set forth.

Third, The combination of the oscillating platform, E, the spring, E', detent, H, revolving wings, B, latch, F, and catch, G, substantially as set forth.

63,652.—METHOD OF PROPELLING STREET CARS.—George S. Petry, Troy Grove, Ill., assignor to himself and George W. Snyder.

First, I claim the driving wheel, A, coiled spring, B, idle wheel, H, toothed bars, I m, and sliding frame, D D, in connection with the axle pinions, I L, all related to each other and operating substantially as and for the purpose herein specified.

Second, I claim the hand lever, O, elbow lever, P, connecting rod, q, rock shaft, C, and ratchet sleeve, c, with pawls, z f, for giving tension to the coiled spring, B, substantially in the manner and for the purpose set forth.

63,653.—MODE OF PROTECTING CHINA GLASS AND OTHER ARTICLES.—Alonzo C. Rand, Union Mills, Penn.

I claim the bottoms of vessels of china earthern porcelain or glass ware, with grooves or depressions for the purpose of applying therein elastic rests, substantially as herein shown and described.

63,654.—PLASTIC COMPOUND FOR PROTECTING METALLIC AND NON-METALLIC SURFACES FROM THE EFFECTS OF AIR AND WATER.—Francois Louis Roux, Toulon, France.

I claim the preparation substantially as herein set forth, of a plastic compound, applicable to the protection of metallic and non-metallic surfaces, from the action of water, air, and other causes of deterioration to which they may be exposed.

63,655.—MACHINE FOR MAKING NAILS.—Jacob Russell (assignor to himself, H. T. McCoun, J. L. Romer and T. T. Buckley, Brooklyn, N. Y.

First, I claim the combination with a stationary nail plate feeding table, or

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its equivalent, of cutters, nipper, gripper and headers, arranged for operation together on a bed or frame having an oscillating motion about an axis perpendicular or nearly so with the horizontal clipping edges of the cutters, substantially as specified.

Second, The arrangement relatively to the cutters and headers of the nipper, K, operating to turn the blank by striking it at or about the middle of its length, essentially as herein set forth.

Third, Imparting to the headers, M M, an oscillating movement in unsion towards and from opposite sides of the mail plate feed, in addition to their heading motion by means substantially as shown and described.

63,656.—DIVIDER AND CALIPER.—Sylvanus Sawyer, Fitchburg, Mass.

I claim the combination of the screw or worm gear A D, with the stirrup and binder F, or its equivalent, as applied to dividers and calipers, the whole being constructed and operating substantially in the manner herein described and set forth.

63,657.—LAND ROLLER.—Joshua S. Shafer, Plymouth, Mich.

I claim hinging the frames B B, to the common end piece A, in which end piece rollers C C, have their bearing for the purpose of making a flexible roller substantially as specified.

63,658 —SAW MILL.—Warren Shumard, A. Lyon and Jasper N. Robbins, Goshen, Ohio.

We claim the arrangement of oblique adjustable bar M, on the sash H, in combination with the screw N, lever P, paul Q, and segmental rack G, for the automatic feed of the rest B, in the manner set forth.

63,659.—POTATO DIGGER.—Philander Sisson, Brant, N. Y.

I claim the hinged platform C, having a sharp cutting edge c3, projecting forward of the axle of the driving wheels and having stationary rake teeth j, projecting in rear of the axle, in combination with a revolving reel having fingers f', with flat connecting bars f2 substantially as described.

63,660.—BOW IRON FOR CARRIAGES.—George W. Slater, New Haven, Conn.

First, I claim the casting of rivets or projections upon the bedplate a, substantially as and for the purpose set forth.

Second, The thimbles E E, as constructed and applied in combination with bow irons C C, substantially for the purpose set forth.

Third, The back plate D, in combination with the bed plate a, when both are constructed as and for the purpose described.

63,661.—EXCAVATING AND DREDGING.—William Sooy Smith, Oak Park, Ill.

I claim the combination and arrangement of the receiving chamber, A, tubes, b b, ejection pipe, a, caps, c c, rack, d, pinion, d', car truck, B, movable rail, e e, upon the sliding frames, g g, of the sills, h h, substantially as herein set forth, for the purpose specified.

63,662.—CAR COUPLING.—John P. Spangle, Hopewell Center, N. Y.

First, I claim the jointed upper lever, C D, in combination with the coupling pin and the receiving draw head, operating substantially as described.

Second, the lower lever, G, in combination with the hook, F, the spring, M, and draw head, I, operating substantially as described.

63,663.—SWITCH.—Geo. W. Spaulding, Norton, Mass.

I claim a safety switch for railroads composed of the grooved rail, a, and the parts, b and d, when constructed and operating substantially as above set forth.

63,664.—GARBAGE AND ASH BOX.—Charles W. Stafford, Saybrook, Conn

First, I claim a garbage or ash box placed within a case provided with a lid or cover, and arranged as herein shown and described, to admit of being elevated and tilted or dumped in order that its contents may be discharged into a cart, substantially as described,

Second, The rod, H, attached to the bottom of the garbage or ash box, D, and provided with the rack, c, the hollow part, C, of the case, A, in which the rod, H, works, the pinion, F, on shaft, G, and the chain, all arranged to operate in the manner substantially as and for the purpose set forth.

63,665.—ASH OR GARBAGE BOX.—Charles W. Stafford, Saybrook, Conn.

I claim a portable garbage and ash box constructed of iron or other suitable metal, having a roller, B, in its base, fixed and movable semispherical covers, E F, and suitable handles, all constructed and arranged substantially as herein shown and described.

63,666.—BRIDGE.—J. Dutton Steele, Pottstown, Pa.

I claim the combination of the two series, substantially as set forth, or their equivalents, made either of wood or of iron, in the manner and for the purpose hereinbefore described.

63,667.—MACHINE FOR CARBURETING AIR TO PRODUCE INFLAMMABLE GAS.—Levi Stevens, Fitchburg, Mass.

I claim the use of the meter wheel for the purpose of carbureting atmospheric air, in the manner substantially as described.

I also claim the flowage regulator constructed of the several parts specified and arranged substantially as described and for the purposes set forth.

63,668.—WHEEL CARRIAGE.—A. K. Stone, Oronoco, Minn.

I claim the combination as well as the arrangement of the two main springs, D D, and the four elastic braces or brace springs, c c c c, with the two axles and the sweep bar, as specified.

I also claim the combination as well as the arrangement of the elastic braces, d d, with the four elastic braces, c c c c, the two main springs, D D, the two axles and the sweep bar, the whole being substantially as hereinbefore explained.

63,669.—WHEEL CARRIAGE.—A. K. Stone, Oronoco, Minn.

I claim the above described arrangement of four main springs, D D E' E', with each other, the carriage body, the rear axle and the sweep bar of the front axle.

I also claim the combination as well as the arrangement of the auxiliary or transverse brace springs, F F, with the main springs, D D and E' E', arranged and applied to the carriage body, the rear axle and the sweep bar of the front axle, substantially as specified.

63,670.—FURNACE FOR STEAM BOILERS.—Wm. S. Storms, Middletown, Ohio.

First, I claim the combination with the fire chamber of a furnace or other heater of an auxillary chamber communicating with the fire chamber and outside air through flues and passages arranged substantially as shown and described.

Second, The combination of the fire chamber and boiler with the upper arch and lower arch or fire bridge of the furnace, under the arrangement and for operation as shown and described.

63,671.—CORN SHELLER.—Wm. D. Stroud, Oshkosh, Wis.

I claim the movable plate, c, and the stationary plate, b, with the diagonal setting of the teeth thereon relatively one to the other on the respective plates, the lever, d, the inside rim, n, the outside rim, m, the hopper, E, the adjustable screw, s, the adjustable spring bearing, g, and the screen, f, when constructed and arranged relatively to themselves and to the frame, a a, substantially as described for the purposes set forth.

63.672.—PISTON PACKING.—Edward Sullivan, Pittsburgh, Pa.

First, I claim the recess, C, between the packing rings of a piston head of a cylinder of a steam engine, as herein described and for the purpose set forth.

Second, The plates, g and h, when used in combination with a joint or joints in metallic and expansive packing of a piston head, as herein described and set forth.

Third, In connection with the above the valve, x, constructed, arranged and operating substantially as herein described and for the purpose set forth.

63,673.—PLANING MACHINE.—John Tesseyman, Dayton, Ohio.

First, I claim the provision in a planing head of an obliquely faced washer or tool holder, H, adjustable about an axis tangential or nearly so to the path of the bit, substantially as set forth.

Second, A tool holder for a disk or conical planer consisting of the oblique faced and serrated washer, H, slotted bolt, D E f, nut, E, and serrated head, B, for the purpose set forth.

63,674.—MACHINE FOR POUNCING HATS.—Chas. H. Vanhouten and Joseph M. Crane, Newark, N. J.

We claim the sliding rim block, provided with the ring, G, for adjusting the same and having a hinged ring or button, H, in combination with the hat block, D, when arranged to operate substantially as herein shown and described and for the purposes set forth.

63,675.—QUARTZ MILL.—Thos. Varney, San Francisco, Cal.

I claim the combination of the slots in the smooth grinding surfaces filled with wood with the peculiar form of the revolving grinder, m, and stationary grinder, p, when constructed and operating substantially as described and for the purpese as set forth.

63,676.—MANUFACTURE OF LIGHT BREAD.—W. J. Walker (assignor to Caroline M. Walker), Baltimore, Md.

I claim the combination of super-phosphate of lime and muriatic acid in nearly equal quantities and bi-carbonate of soda in such quantity as when united in the dough will in process of baking evolve sufficient gas to make light bread or pastry, substantially as above described.

63,677.—DISH WASHER.—Wm. Way, Samuel B. Way, and Samuel C. Pomeroy, South Butler, N. Y.

We claim the depression, C, in the bottom of vessel, B, for collecting all the water in the machine immediately about a wheel, D, which is in diameter considerably smaller than the diameter of the main chamber, B, substantially in the manner and for the purpose set forth.

The washing wheel, D, having buckets with concave faces in a radial direction, and arranged spirally in a longitudinal direction, substantially as and for the purpose set forth.

The lateral sliding shaft, f, and coupling, e, in combination with a horizontal washing wheel, D, and rack, K, substantially in the manner and for the purpose herein specified.

63,678.—EVAPORATING PAN.—James A. Webb, Madison, N. J., and Christopher Cory, Lima, Ind., assignors to Christopher Cory.

First, We claim the application of steam or its equivalent to evaporating pans by means of under channels with or without valves, so arranged as to produce the greater amount of heat and ebullition either at the center or at one side of the pan or at certain given portions thereof as desired, while other portions of it shall be less heated and agitated, as herein set forth.

Second, We claim the applying of steam beneath the pans so that their interior shall be left unobstructed for the work of the operator.

Third, The combination with an evaporating pan of a steam channel or chamber, substantially as above set forth.

Fourth, The application of non-conductors of heat to the under steam channels or chambers of evaporating pans, substantially as set forth and described.

63,679.—SAWING MACHINE.—Edwin Wescott, Hudson City, N. J.

First, I claim the screw spindle, J, and worm wheels, f f', in combination with the feed rollers, D D', constructed and operating substantially as and for the purpose described.

Second, The adjustable boxes, l l', gudgeons, m, set screws, n, and saw spindle, L, when constructed and arranged as herein set forth, for the purpose specified.

63,680.—NOZZLE FOR HOSE PIPES.—Albert M. White, New York City.

I claim the combination of the socket, A, pipe, B, and collar, C, with the valve, g, and valve seat, e, all constructed arranged and operating substantially as herein shown and described.

63,681.—ROCK DRILL.—T. R. White (assignor to himself and W. G. Bedford), Philadelphia, Pa. Antedated March 29, 1867.

First, I claim the combination of a drill stock and detachable cutters, D E, when the latter are constructed and adapted to each other and for attachment to a stock, substantially as and for the purpose specified.

Second, The detachable block, C, in combination with the drill stock and with the detachable cutters, D E, their rods, c, and nuts, d, or their equivalents, the whole being constructed and arranged substantially as and for the purpose set forth.

Third, A rock having three radial and three curved cutting edges, arranged in respect to each other as shown and described.

63,682.—WELL-BORING APPARATUS.—T. B. White and W. G. Bedford, Philadelphia, Pa. Antedated March 29, 1867.

First, We claim the revolving disk, E, with its slot and spring catches, b b', or their equivalents, in combination with the sliding block, F, connected to the drill rods and the projection, d, or its equivalent the whole being constructed and operating substantially as and for the purpose described.

Second, The rod, H, and spring bar, p, screw, I, and nut, G', secured to the drill rods, in combination with the bracket, G, and its inclined projections, n n, and the within described operating devices or their equivalents, the whole being constructed and arranged for joint operation substantially as specified.

Third, The swivel, e, with its ratchet, j, in combination with the rod, H, and its spring pawl, i, substantially as and for the purpose set forth.

Fourth, The shaft, D', its wheels, N and K, in combination with the rod, J, wheel, k, cam disk, L, and rod, M, the whole being arranged and operating substantially as described.

63,683.—MELODEN.—A. W. Wilcox, Worcester, Mass.

First, I claim the combination with chamber, B, of the valves, 1' 2' and 3', for the purposes stated.

Second, The combination with chamber, B, and swell box, C, of the valves, 1' 2' and 3', and D E, arranged for joint operation as set forth.

63,684.—BIT BRACE.—Wm. H. Woods, San Francisco, Cal.

I claim the brace head consisting of the collar, D, the block, E, the pin, g, and the steps, m and n, with the nut, G, substantially as and for the purpose described.

63,685.—SEED PLANTER.—A. R. Worth, Nantucket, Mass.

I claim a seed wheel, N, provided with a number of cups exactly corresponding to the number of seed required to be planted in a single hill, or so placing the cups at such a distance apart as will regulate the required distance of the seed from each other when planted in a drill.

I also claim the block, m, with its spring, o, in combination with the bar, U, with its spring, s, inclined portion, r, and stop, q, operating substantially as and for the purpose set forth.

I also claim a hopper or seed receptacle, M, with its partitions or plates, h, and having its opening, l, to the seed passage, constructed substantially as above described, in combination with a revolving seed wheel, N, provided with a number of seed crips, g, equal to the number of seed to be planted in a hill, substantially as set forth.

I also claim a hopper or seed receptacle, M, made removable in the manner and for the purpose set forth.

I also claim the hoes, X, and roller, T, in combination with the frame, R, arranged and operating substantially as and for the purpose set forth.

63,686.—CATTLE CAR.—J. H. Aldrich, Nashua, N. H.

I claim the combination and arrangement of the water and feed trough, separated by the lid, when constructed and used upon a cattle car, in the manner and for the purpose herein described.

63,687.—GATE.—W. D. Armstrong and W. I. Armstrong, Harlem, Ill.

First, We claim the combination of the eccentric pulley or wheel I, with one of the central posts, B, and with the cord or chain, S, of the heavy or balance weight, R, substantially as herein shown and described and for the purpose set forth.

Second, Pivoting the lower ends of the side levers, J, to the central posts, B, by a long bolt, K, substantially as herein shown and described and for the purpose set forth.

Third, Attaching a spring catch, V, to the forward end of the gate, and operating it by the cords or chains, M, by which the gate is operated, substantially as herein shown and described.

Fourth, The combination of the guards, L, with the sides of the gate, G, and with the side levers, J, substantially as herein shown and described and for the purpose set forth.

Fifth, The combination of the long pulleys or friction rollers, N and U, with the central posts, B, and with the cords or chains, M and S, substantially as herein shown and described, and for the purpose set forth.

63,688.—SHEEP-FEEDING TROUGH.—Columbus Aulls, Bridgewater, Mich.

First, I claim constructing the trough, A, with one side board, a', extended beyond the ends of the trough, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the counterbalances, E, with the trough, A, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the standards, B, having slats or braces, D, attached to them, with trough, A, substantially as herein shown and described and for the purpose set forth.

Fourth, Hinging the trough, A, to the standards, B, substantially as herein shown and described and for the purpose set forth.

63,689.—PIPE WRENCH.—Robert Bain, Brooklyn, N. Y.

I claim, in combination with the jaw levers, A and B, the sliding strap, C, with its screw, D, and wedge or gib, F, for operation together, essentially as herein set forth.

63,690.—CONVERTIBLE RIFLE SIGHT.—Edgar B. Beach, West Meriden, Conn.

I claim the combination of the covered sight, c, and open sight, d, constructed and arranged so as to be changed to present either the one or the other, substantially in the manner described.

63,691.—APPARATUS FOR UPSETTING TIRES. — George M. Beardsley, Fentonville, Mich., assignor to himself and C. D. Bontell, Deerfield, Mich.

I claim, First, In combination with the levers, d, and a device for operating the same, the leaves, B, rod, g, and cams, h, when the latter are used in connection with movable or stationary jaws, r r1 r2, the arms, H, substantially in the manner and for the purpose set forth.

Second, The self-clamping lever cams, h, in combination with the jaws, r1, forming a clamping device, as herein described.

Third, The movable jaws, r1 r2, in combination with the arms, H H, swinging upon the same center, for the purpose herein set forth.

63,692.—STRAW CUTTER.—George M. Beardsley, Fentonville, Mich., assignor to himself, C. D. Bontell, and G. Carpenter.

I claim, First, The knife, C, when shaped as shown, and set eccentrically upon a fly wheel solid except as to a slot conforming to the knife, substantially as and for the purpose set forth.

Second, The endless bands, E, in combination with the pulleys, G, constructed, arranged, and receiving motion, substantially in the manner and for the purpose set forth.

Third, A mechanism for operating automatically and simultaneously the jaws, P and Q1, in relation to the knife, C, substantially as and for the purpose set forth.

63,693. — SCAFFOLD BRACKET. — Hiram Beckwith, Grass Lake, Mich.

I claim a roof bracket, constructed substantially as as herein shown and described. with two blades, with their back pieces, and supported by the brace, D, for the purposes set forth.

63,694.—ROTARY STEAM ENGINE.—John P. Birch, Philadelphia, Penn., assignor to himself and G. W. Paterson, Newburyport, Mass.

I claim, First, The combination with the steam cylinder and eccentric piston case of the pistons under the arrangement herein described, so that the said pistons, although revolving upon a common axis or center of motion, concentric with that of the steam cylinder, shall be unconnected with and separate from each other and the said cylinder, substantially as shown and described.

Second, The combination of the hollow piston case, mounted upon a shaft, having its bearing in one end of and eccentrically to the steam cylinder, with the pistons separate from each other, but revolving upon a common axis, which is also the axis of the steam cylinder, substantially as shown and set forth.

Third, The arrangement of the steam cylinder with reference to its three bearing points located one upon each side of the cylinder, and the third upon the shaft of the piston case, substantially in the manner and for the purposes herein specified.

63.695.—FLUE SCRAPER.—F. A. Blake and H. A. Tyrrel, Worcester, Mass.

I claim, First, The combination with rod, A, of the spiral spring, substantially as and for the purposes stated.

Second, The combination of spring, B, with rod, A, and pins, a a and b b, substantially as and for the purposes set forth.

63,696.—CAR COUPLING.—A. T. Boon and D. M. Osborn, Galesburg, Ill., assignors to A, T. Boon and Thomas R. Markillic.

I claim the pivoted catch or dog, B, curved guides, F, rubber bar, e, and lever, C, as arranged, and combined, and operating in combination with the forked arm, D, and link, E, substantially in the manner and for the purpose as herein set forth.

63,697.—WOODEN PIPE.—A. Brisbane, New York City.

I claim, as a new article of manufacture, wooden pipes or tubes formed by bending boards, slats, or strips of wood longitudinally, as herein described.

63,698.—CULTIVATOR.—H. C. Bristol, Ravenna, Ohio.

First, I claim the movable frames, C, provided with the adjustable standards, G, and shares, H, as arranged and connected in combination with the levers, D, draft chains, P, and carriage, for the purpose and in the manner set forth.

Second, The jointed standard, I, provided with the shovel, J, and guide stay, K, in combination with the standards, G, shares, H, and carriage, as and for the purpose described.

63,699.—LET-OFF MECHANISM FOR LOOMS.—Mahlon Brookfield, Brookfield, Iowa.

I claim the graduated scale beam, F, combined with a feed screw, H, and weight, suspended from a friction strap or device, on the warp beam, and to be used in connection with different sets or speeds of gear, substantially as described and represented.

63,700.—BLACKING CASE.—Clarence E. Brown (assignor to himself and the Florence Manufacturing Company), Northampton, Mass.

I claim a blacking case composed of the exterior shell or case, A, surrounding and containing the brushes, B C, the latter brush, C, being provided with a rim, b, formed so as to fit over and support the blacking box, D, all these parts being arranged in the manner and for the purpose herein shown and described.

63,701.—SHEEN-METAL BOILERS AND OTHER VESSELS.—John Carroll, New York City.

I claim providing the cylindrical body, A, of sheet metal vessels, with spiral corrugations, which extend from end to end of the body, for the purpose of strengthening the same, as well as to facilitate the attachment of the heads, B B, to the body, which heads are also corrugated, substantially as herein shown and described.

63,702. PURIFYING AND PREPARING GLASS ORE. Enoch Carter, Newburgh, N. Y.

First, I claim melting the glass ore or rock, in a reverberatory or other furnace, with or without alkalies or salt as a flux, and using the product in lump as it comes from the furnace, or dropping it in water as "cutlett."

Second, The use of this "cutlett" for the manufacture of glass, either alone or in combination with the crude ore with alkaline, sand, lime, quartz, or other materials.

63,703.—MACHINE FOR STRETCHING AND WINDING SILK THREAD.—Michel Cellerier, Philadelphia, Pa

First, I claim in combination with a silk reeling machine, constructed as described, an adjustable lever brake, applied to the pulley of the spindle which carries the bobbin from which the silk thread is reeled, for the purpose of subjecting the thread to a uniform tension, and thus equalizing its quality, as specified.

Second, The removable friction reel R R', constructed, arranged, and operating as described.

63,704.—COMBINED ROLLER AND SEEDER.—H. S. Connelly, Clymer, N. Y.

First, I claim resting the inner journals of the main rollers in adjustable bearings, and connecting said bearings with the driver's seat, substantially as and for the purpose set forth.

Second, The combination of the cross arm, f, with the adjustable bearings, c c, and the seat, C, for the purpose of allowing the one seat to act upon the two rollers, substantially as specified.

Third, The combination with the subject matter of the preceding claim of the joints formed of the elongated tenons, d, and mortises, e, for allowing each roller an independent action, as specified.

Fourth, The combination of the pivoted scrapers, G, with the adjusting roller, B, as shown and described and for the purposes specified.

Fifth, The arrangement of two or more seed slides, K K, resting in compartments, v v, and connecting by screws and slots, w x, or equivalent, with the single head, u, in such a manner that the escape of the contents of each compartment may be exactly gaged to produce the desired mixture, as specified.

Sixth, The special construction and arrangement of the machine, as herein set forth.

63,705.—CARRIAGE WHEEL.—Joseph M. Coombs, Boston, Mass., assignor through mesne assignments to Charles W. Chipman and John Raddin, Lynn, Mass.

I claim an elastic wheel constructed with a provision for contraction of the bearing surface of the felly towards the hub, when also so constructed that the expansion of the sides of the wheel produced by such contraction is resisted by springs, substantially as set forth.

63,706.—BOLT AND BOLT HEADS.—Joseph Crompton, Little Falls, N. J.

I claim, First, The eccentrically-headed screw bolt, C, in combination with the nut, E, and the eccentric collar, H, placed around the bolt, substantially as described.

Second, I also claim the combination of the bolt, C, having an eccentric head, F, with the eccentric collar, H, or its equivalent, the patch or plate, B, and the boiler plate or article to which the plate, B, is united, substantially as shown.

63,707.—CUTTER HEAD FOR WOOD-MOLDING MACHINES.—David Cumming, Jr. (assignor to himself and Stephen W. Smith), New York City.

I claim a cutter head formed with a guide both above and below the cutter in combination with mechanism for raising or lowering the cutter relatively with the bed, so that the pattern and wood to be planed can be laid either side upwards on the bed (according to the direction of the grain of the wood when planing) and the cutter and guides be brought to their proper places relatively to the wood and the pattern, as set forth.

63,708.—CHURN.—John T. Dawson, Frostburg, Md.

First, I claim the revolving dasher, D, constructed substantially as described and operating in combination with the rectangular vessel or its equivalent, essentially as set forth.

Second, The pan, E, arranged and operating in combination with the dasher, D, substantially as specified.

63,709.—DENTAL APPARATUS.—William H. Dibble, Bordentown, N. J.

First, I claim placing the air valve which allows the escape of air when the pump is compressed, below the reservoir which receives the liquids drawn from the mouth, substantially as set forth.

Second, I also claim placing the rest which supports the upper jaw, upon the same frame which sustains the tongue-holder or plate, K, substantially as set forth.

Third, I also claim connecting the tongue-holder or plate, K, directly with the tube which receives the saliva and other liquids from the mouth, substantially as shown.

Fourth, I also claim perforating the tube, J, at any suitable point on that side which is protected by plate, K, from contact with the tongue, so that saliva and other liquids can be drawn out of the mouth without interruption, substantially as shown.

Fifth, I also claim making the apparatus flexible in some convenient part, by inserting a flexible division as in the tube, H, or by a joint where the tube is left rigid, substantially as set forth.

63,710.—GATE.—E. R. Dobbs, Poughkeepsie, N. Y.

I claim the pivoted or adjustable ways, D J, with the gate, B, resting thereon, in combination with the platforms, M M, connected with the ways to operate in the manner substantially as and for the purpose herein set forth.

63,711.—DOUBLE-SHOVEL PLOW.—Jacob M. Ely, Warren, Ill.

First, I claim an improved iron double-shovel plow, formed by the combination of the beam, A, handles, B, standards or supports, E, and braces, D and G, with each other, when said parts are formed and arranged substantially as herein shown and described.

Second, Making the uprights or standards, E, substantially in the shape herein shown and described and for the purpose set forth.

63,712.—GRINDING MILL.—Jacob Fickinger, Kingsville, Ohio.

I claim the fans, F, caps, G, and openings, c, in combination with the mill stones and curb, as and for the purpose set forth.

63,713.—QUARTZ MILL.—James B. Fields (assignor to himself and Peter Fields), Jersey City, N. J.

First, I claim the hollow rotating cylinder, B, in combination with the crusher, G, the latter being placed within the former, and having their crushing or pulverizing surfaces, c g, moving with different speeds, by the means substantially as and for the purpose set forth.

Second, The shields, E, attached to the inner surfaces of the sides, a a, of cylinder, B, in combination with the openings, d, in the sides of the cylinder, B, covered with screens, and the crusher, G, all arranged to operate in the manner as and for the purpose specified.

63,714.—BRIDGE.—Albert Fink, Louisville, Ky.

I claim as a new and useful improvement in bridge trusses, the peculiar connection of wooden braces with the upper and lower chords of a bridge truss, by means of cast-iron shoes, G H and F, brace straps, J J and K, and plates, I I and I, for the purpose of forming a firm connection either for the resisting of compressive or tensile strains, substantially as described in the above specification.

63,715.—SAW SET AND GUMMER.—John Gardner, Viroqua, Wis.

I claim the cam lever, E, pivoted to the posts, F, rest, G, hammer, B, spring, D, anvil, J, and rest, I, when all are constructed and arranged upon the bed plate, A, as herein set forth for the purpose specified.

63,716.—CHERRY STONER.—George Geer (assignor to himself, J. G. Hadley and William Hamilton), Galesburg, Ill.

I claim, First, The rocking shaft and the curved forked plungers with the handle or lever made and arranged and operating in the manner as and for the purpose herein shown and described.

Second, The upright plate for the combined purpose of arresting the downward stroke of the plungers and stripping the cherries from the forks, made and arranged substantially as shown and described.

63,717.—CULTIVATOR.—Alexander Gordon (assignor to H. D. Gordon), Rochester, N. Y.

I claim, First, The adjustable or swinging clamps, a, in combination with

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the mold board, B, for the purpose of holding the wings, w, substantially as shown and for the purposes specified.

Second, The skeleton metallic cross bar or tie, C, constructed as shown and described, and arranged in connection with the shovel and teeth or hoe tandards, for the purposes set forth.

Third, The diagonal guide or extension bars, b, in combination with the teeth bars, D, as shown and described.

63,718.—CARPET FASTENER.—C. Gullmann, Poughkeepsie, N. Y.

I claim the combination of the protecting rod, A, and detaining rod, B, substantially as and for the purpose deecribed.

63,719.—HORSE HAY FORK.—James J. Hall, Trenton, N. J., assignor to himself, John T. and Isaac Pierce and H. I. Fowler.

I claim, First, The use of the guards, m, when used in combination with the cross head, A, and yoke, B, as herein described and for the purpose set forth.

Second, In combination with the above the pawl, i, and ratchet wheel, C, when used for holding the tine, f, in a fixed position, as herein described and for the purpose set forth.

63,720.—STOVE-PIPE DRUM.—Samuel A. Halladay, Marrilla, N. Y.

I claim the inverted hollow arch, A, supporting the heater, its ends connecting the spiral flue, D, with the short pipe, a, for the passage of the products of combustion, as herein set forth for the purpose specified.

The ring, G, and the shelves, f, in combination with the flue, C, and the drum, B, as and for the purposes set forth.

63,721.—BOLT CUTTER.—Homer M. Handy, Niles, Mich.

First, I claim securing the curved and abutting handles, A and B, one to the other by means of the plate, a and a', and b and b', rivetted to said handles and the pivot or journal, z, all as herein set forth.

Second, Pivoting the jaws, C and D, to each other by means of the tongue, c', and straps or plates, E and F, substantially as herein shown and described and for the purpose set forth.

63,722.—COMBINATION PADLOCK.—Abner S. Harding and Nicholas Reed, Otisville, N. Y.

I claim the hinged lid, e, of the case, A, in combination with the screw, g, shackle, E, disks, C, and bolt, B, constructed and operating substantially as and for the purpose described.

63,723.—CHURN DASHER.—M. B. Hudson (assignor to himself, J. S. Robinson and J. G. Hudson), Canandaigua, N. Y.

I claim the special combination and arrangement of the valve, C, with the conical dasher, A, the said valve being situated outside the dasher and being removable from the dasher and rod and covering all the ports when in use, as herein set forth.

63,724.—CORN PLANTER.—William Hunter, Hastings, Minn.

I claim the combination of the hollow cylinder, B, with the slide bars, c c c, the hoppers, f f f, and the lever, h, constructed and arranged for planing corn, substantially as herein described.

63,725.—FENCE POST.—George Ipe, Kent, Ohio.

I claim an improved stool for fence posts made of cast iron cast solid in one piece and in substantially the form herein shown and described; that is to say, consisting of the base plate, a1, inclined side plates, a2, and top plate, a3, having flanges, a4 a5, formed upon its upper side, as and for the purpose set forth.

63,726.—STARTING APPARATUS FOR STREET CARS.—Thomas B. Jordan, Gloucester, N. J.

I claim the combination of the lever, b, eccentric block, c, the cord, e, the sliding cross bar, f, the latch, l, and the spring, h, with the sliding tongue, C, the car wheels, B, and the axle, a, arranged and operating substantially as and for the purposes herein described.

63,727.—BURNING FLUID.—Jacob J. Kamm, Fort Wayne, Ind.

I claim the combination of the within-specified ingredients in the manner described for the purpose of forming an illuminating non-explosive burning fluid.

63,728.—CHURN.—Richard Keese, Bennington, Ohio.

I claim the adjustable dashers, D E G, and thumb screws, C, constructed and arranged in relation to each other, as specified, and in combination with the shaft and body of the churn, operating as and for the purpose set forth.

63,729.—HORSE RAKE.—Watson King, Springfield, Ill.

I claim, First, Extending the crank arms, a, below the axle of the wheels so that the traces may be attached to these extensions, for the purposes herein shown and described.

Second, The combination with bar, C, the thills, D, the cleaning teeth, G, and hinge, c, of the rake head, A, all arranged substantially in the manner and for the purpose herein shown and described.

63,730.—SASH SUPPORTER.—W. M. Kirkpatrick, Littleton, Ill.

I claim a sash supporter consisting of a stationary rubber cushion or disk inserted in a recess in either the sash or the frame with its outer face protruding therefrom sufficiently to press upon the corresponding face of the frame or sash and hold the sash in place, substantially as herein shown and described.

63,731.—MOP HEAD.—W. A. Lewis (assignor to himself and H. H. Mason and Jos. Messenger), Springfield, Vt.

I claim the operating thumb nut, C, provided with external and internal screw threads in combination with the fixed screw, B, on the handle and the sliding jaw, F, substantially as and for the purpose described.

63,732.—CATTLE PUMP.—Wm. Lindsey, Oberlin, Ohio.

First, I claim the spring, C, link, b, valve, a, and collar, D, as arranged in combination with the plunger, E, pipe, F, and cylinders, A B, for the purpose and in the manner as specified.

Second, The sleeve, J, platforms, L, and arms, M, as arranged in combination with the pipe, F, plunger, E, spring, C, for the purpose and in the manner as described.

Third, Standards, N, links, P, arms, K, and trough, Q, as arranged in the manner and for the purpose herein specified.

63,733.—COMPOUND FOR PRINTERS INK.—Henry Loewenberg, New York City, assignor to himself and Emile Granier.

First, I claim a printer's ink made of sirup, molasses, honey or other saccharine substance in combination with suitable coloring matter, substantially as and for the purposes described.

Second, A printer's ink composed of sirup, molasses, honey, or other saccharine substance in combination with glycerin, or oily matter or both and with suitable coloring matter, substantially as and for the purpose set forth.

63,734.—MARKING COMPOUND.—Henry Loewenberg, New York City, assignor to himself and Emile Granier.

I claim a marking compound either in a liquid or solid form, containing iodine, or bromine either, or both, substantially as and for the purpose set forth.

63,735.—FIRE ESCAPE LADDER.—Russel Loomis, Saratoga, Springs, N. Y.

I claim the revolving disks, D D, having in their sides, the scroll grooves, c c, the friction rollers, i i, on the cross bars, d d, and the cap, h, in combination with the lazy tongs, B, arranged and operating substantially as and for the purpose herein described.

63,736.—OX BOW PIN.—John Low, New Britain, Conn.

I claim the construction of the plate, a b c, with arm, n, and spring, t, in the manner and for the purposes herein specified.

63,737.—SPIKE.—George W. McGill, Washington, D. C.

First, I claim a spike split into three parts or prongs the center prong being longer than the side prongs and said side prongs being so beveled that on being driven into the wood they will spread and diverge from the center prong in opposite directions, while the said center prong goes down into the wood, perpendicularly, substantially as shown and described.

Second, A spike split into three parts or prongs throughout the whole extent of the shank that is to be driven into the wood with the side prongs beveled as described so that the spike may be driven into the wood and the side prong made to spread and diverge without boring, substantially as described.

63,738.—SPIKES.—John Merlett, Bound Brook, N. J. Antedated April 1, 1867.

First, I claim the wedged shaped ribs, c d, forming shoulders, c' d' at their upper ends and arranged upon the lower portion of the spike, substantially as herein set forth for the purpose specified.

Second, The lug, g, constructed with a cutting edge, n', and with inclined sides, g', in combination and arranged in relation with the wedge shaped ribs, c d, and with the body of the spike, substantially as herein set forth for the purpose specified.

63,739.—CARRIAGE.—J. H. Moore, Warren, Mass.

I claim the combination of the carriage body, its seat, thorough braces, springs and perches, when arranged with respect to the fore and hind axle of a carriage, substantially as shown and described.

63,740.—MACHINE FOR POLISHING WAGON SPOKES.—S. L. Myers and George Willison, Massillon, Ohio.

First, We claim the board, D, pivoted at d, to the frame, A, and having the braces, I I, sliding shaft, G, with arms, H H', the latter bearing the chuck, K, and crank, L, when all are constructed and arranged in such a manner that the operator may when desired impart a combined revolving vibrating reciprocating motion to the spoke, substantially as herein set forth.

Second, The concave horizontal table, C, covered with an elastic cushion upon which the polishing material is placed when constructed and operating as herein set forth for the purpose specified.

63,741.—SCREW CUTTER.—Jacob K. Nelson, Greenpoint, N. Y.

I claim in combination with the revolving head, B, the detachable socket, D, fitted with loose or detachable blocks, F F G or H, forming chassers cutters, steadying blocks or grippers and made capable of radial adjustment from the outside of the revolving head of the hand tool or wrench, substantially as and for the purposes herein set forth.

63,742.—DIES FOR FORMING HINGES.—James O'Kane, New York City. Antedated April 1, 1867.

I claim the two communicating slits or channels, r r, arranged with reference to the circular groove, s, of a draw plate, as and for the purpose set forth.

63,743.—SASH SUPPORTER.—Dwight J. Osborn, Windsor Locks, Conn.

First, I claim the arrangement upon the plate, A, of the part, B, operated by the handle, D, in combination with the pieces, c c, having projections upon them for the purpose of entering and supporting the sashes, substantially as set forth.

Second, In combination with the supporter constructed as above the piece, G, for fastening the handle, D, substantially as set forth.

63,744.—APPARATUS FOR DYEING, BLEACHING WASHING, AND DRYING YARNS AND THREAD.—Isaac Osgood, Utica, N. Y., and Alexander Munroe, German Flats, N. Y.

First, We claim the apparatus for dyeing, bleaching or cleansing threads or twists of any fibrous material consisting of the perforated metallic bobbins or cop tubes when used in combination with the tanks, C and D, force pump, E, pipes, b and e, and vertical pipes, r, the whole arranged and operating substantially as described.

Second. The use of a perforated cop tube in combination with a perforated cop-sheath, substantially as set forth.

Third, The method of dyeing bleaching or cleansing threads or twists of any fibrous material, substantially as hereinbefore described.

Fourth, An article of manufacture a perforated metallic bobbin consisting of stem, n, and base, m, when constructed substantially as described.

63,745.—STEAM ENGINE SLIDE VALVES.—Edwin and Thomas S. Parker, Schenectady, N. Y.

We claim in the valve, B, constructed substantially as herein shown and described with the cavity, C, the apertures, c c, as and for the purposes set forth.

63,746.—KNITTING MACHINE NEEDLES.—B. F. Peaslee, Lake Village, N. H.

I claim forming fixed journals, a a, on the latch of the needle, substantially as and for the purpose herein specified.

63,747.—STUFFING BOX FOR DEEP WELL PUMPS.—J. B. Betty and Jerome Fredricks, Conneaut, Ohio.

First, We claim an elastic stuffing box for oil wells formed of a rubber cylinder cased in leather, or its equivalent combined with a hollow taper screw forming part of the well tubing and working in a female screw within the cylinder divided into two or more longitudinal sections, constructed and operating substantially as and for the purpose herein described.

Second, We claim the perforated collar, f, placed on the tubing below the stuffing box and the washer g, on the screw e, above the stuffing box in combination therewith constructed as and for the purposes herein described.

63,748.—FAUCETS.—Joshua Regester, Baltimore, Md.

In combination with the perforated disk valve, d, cut off plate, b, and longitudinal stem, c, having two bearings, b and g, I claim the construction of the handle, C, with a flange h', adapted to operate substantially as described.

63,749.—DEODORIZING PETROLEUM.—Thomas Restieaux, Boston, Mass.

I claim the application of quicksilver to petroleum and any of the products of petroleum as herein described using for that purpose the aforesaid solution or any other, substantially the same and which will produce the intended effect.

63,750.—CAR COUPLING.—C. M. Reynolds, Champaign, Ill.

I claim the arrangement of the bumpers, A A', constructed as described with the jaws, C C, springs, b b, and cam, D, when used in combination with the draw bar, B, provided with springs, a a, and connected to the bumper, A, by the pin, T. as and for the purpose herein specified.

63,751.—PEAT MACHINE.—M. S. Roberts, Lewiston, N. Y.

First, I claim the so hanging and arranging the outer section of the conveyor frame to its main portion that it can be raised or lowered, and set at any desired angle with regard thereto, substantially as and for the purpose described.

Second, Forming the bottom of the mill of a series of knives or cutter blades fixed in a common revolving frame in combination with the partition or plates hung across such portion of the mill, substantially as and for the purpose described

Third, The fixed partition plate of the mill in combination with the side opening thereof, substantially as described for the purpose set forth.

Fourth, The arrangement of the series of scrapers in the bottom box of the mill as and for the purpose described.

Fifth, The open endless distributor having a series of partitions or cross plates, in combination with the bottom of the frame in which it moves, substantially as and for the purpose described.

63,752.—HAND LOOM.—Adam Rosenberger, Brandonville, W. Va.

First, I claim the combination with the roller, P, staples, O, and pivoted frame, Q, of the hooks, H i, treadles, G, attaching pieces, F, and levers, S S, all constructed and arranged in the manner described and employed to effect the shifting of the harness as set forth.

Second, In combination with the above I claim pendant, K, thumb screw, L, pulley, J, and cords, e, arranged as described and employed for adjusting the harness as specified.

63,753.—GRIDIRON.—E. P. Russell, Manlius, N. Y.

I claim the two halves, A C, and B D, when constructed so that the bars of one half shall cross the bars of the other, and when combined and arranged with the square heeled hinge, E F, operating as described so as to form a reversible gridiron.

63,754.—STARCH GLOSS.—Henry Sawyer, Boston, Mass.

I claim the use or employment of paroffine in combination with starch substantially in manner and for the purpose as before described.

63,755.—MILK VAT.—Levi C. and John M. Schermerhorn, North Gage, N. Y.

We claim the perforated steam and water pipes introduced into the space between the exterior and interior vats, for the purpose of heating regularly with steam and instantly (when necessary) shutting off the steam and applying jets of cold water to cool the contents of the inner vat, by means and for the purposes herein described.

63,756.—PORTABLE SODA FOUNTAIN.—A. D. Schnackenberg, Brooklyn, N. Y.

I claim closing the end of the high pressure tube b, directly with a conical plug B, without the use of a leather or other washer or packing for the valve, all made and operating substantially as and for the purpose herein shown and described.

63,757.—FARM GATE.—Elijah C. Sears, Crystal Lake, Ill.

First I claim in the construction of a board gate the arrangement of the double guide e, and the friction rollers g g' in the rear cleat b, in combination with the upper board d, of the fence A, operating as herein described.

Second, I also claim the single guides m m', at the top and bottom of the cleat k, in combination with the roller g2 and the upper and lower boards of the gate B, arranged and operating as herein set forth.

Third, I also claim the notch i, in the centre post h, to clear the double guide e, when the gate is opened or closed as herein specified.

63,758.—WASHING MACHINE.—J. S. Sills, Cedarville, Ill.

I claim the corrugated board I, in combination with the upper rubbing board E, having the slats D, rim G, handles F, the lower rubbing board consisting of the semi-circular boards A, and slats B, substantially as herein set forth for the purpose specified.

63,759.—CLOTHES PIN.—David M. Smith, Springfield, Vt.

I claim the wooden key B, for connecting the two jaws A A, consisting of the central peice d, having slotted cylindrical ends c c, held in place by means of the pins e e, as herein shown and described.

63,760.—MACHINE FOR FORMING THE BRANCH TUBE OF VALVE CASE FOR CORNET.—Lewis W. Spencer, (assignor to Schreiber Cornet Manufacturing Company), New York, N. Y.

I claim the combination of the mandrel, the slide on the chuck of the mandrel, the index plate with its spindle at right angles to the axis of the mandrel and also to the slide, and the sliding stock or tool holder, substantially as and for the purpose described.

63,761.—MACHINE FOR FORMING THE BELLS OF CORNETS.—Lewis W. Spencer, (assignor to Schreiber Cornet Manufacturing Company), New York, N. Y.

I claim the combination of the die, the leaden or equivalent dise, the former, and the follower, substantially as and for the purpose described.

63,762.—HITCHING HOOK.—Charles Starbuck, Philadelphia, Penn.

I claim the construction and application of the cam lever A', so that it will operate in combination with the main portion A, of the hook substantially in the manner described for the purposes specified.

63,763.—GRAIN CLEANER.—George Stevenson, Zionsville, Ind.

I claim the stationary cam disc C, and the spring i, in combination with the screen B, for operating the rubber bar n, arranged substantially as herein described.

63,764.—PORTABLE FENCE.—James W. Suidter, Sharon, Wis.

I claim the portable fence constructed with panels A, cross braces B, and foot pieces C, with or without the pin D, said parts being respectfully constructed and the whole combined substantially as set forth.

63,765.—WAGON BRAKE.—W. Tash, Berlin, Ill.

I claim the rollers s s, upon the guide rods g g, of the bolster d, in combination with the guide bars s s', box A, substantially as herein shown and described,

63,766.—MACHINE FOR SHAPING AND HEADING BARS OF METAL.—Hiram Thompson, Worcester, Mass.

First, I claim the arrangement for giving motion to the jaw, a, and die, f, of the knuckle joint, b, and wheel, B, as described.

Second, The combination with the revolving wheel, A, jaw, a, and die, f, of the wedge, o, and set screws, 1 and 2, said parts being constructed and arranged for operation substantially as and for the purposes set forth.

63,767.—COTTON CULTIVATOR.—John Robert Wallace and Benjamin A. McClain, Murfreesboro, Tenn.

We claim the scrapers or shares, H, arranged or applied to the front part of the machine so as to be capable of being adjusted higher or lower to penetrate a greater or less depth into the soil and also capable of being raised entirely therefrom, substantially as set forth.

63,768.—WINDOW-BLIND FASTENING.—Alexander Warner, Brooklyn, N. Y.

I claim the slat fastener consisting in the combination of plates, b and b', when provided with holes or recesses, the bolts, a and a', substantially as and for the purposes herein shown and described.

63,769.—GATE LATCH.—W. T. Wells, Decatur, Ill.

I claim an improved gate latch formed by the combination of the adjustable bolt, D, and pivoted lever handle, F, with each other and with the frame of the gate, B, substantially as herein shown and described.

63,770.—CENTRIFUGAL MACHINES FOR DRAINING SUGAR AND OTHER SUBSTANCES.—D. M. Weston, Boston, Mass.

I claim the construction of centrifugal machines made to separate liquids from other substances by suspending such machine at the tops by flexible connections, operating substantially as above described.

I claim the construction of the openings, i i i i, in the bottom of the cylinder, g, in such machines and the valve, j, for the purpose and operating substantially as above described.

63,771.—ROAD SCRAPER.—Geo. H. White, Huntington, Mass.

First, I claim the scraper plate, A, constructed substantially in the form and manner herein shown and described.

Second, The combination of the pivoted caster wheels, E, with the scraper substantially as herein shown and described and for the purpose set forth.

Third, The combination of the pinion wheels, J, and racks, I, with the pivoting blocks, D, of the wheels, E, substantially as herein shown and described and for the purpose set forth.

63,772.—STEAMER FOR CULINARY PURPOSES.—Anthony L. Whitney, Brooklyn, E. D., N. Y,

I claim the combination of the vessels, A B, and D, with each other, substantially as and for the purpose herein shown and described.

The intermediate vessel or pan, D, made and operating substantially as and for the purpose herein shown and described.

63,773.—MACHINE FOR GRINDING SAWS.—Baxter D. Whitney, Winchendon, Mass.

I claim reducing the plates or cylindrical saws to an even and uniform thickness, by means of the sliding frame, B, on which the saw, E, is supported revolved and moved laterally, by the action of the reversible screw, L, slide, P, and lever, M, in combination with the grind stone or grinding wheel, K, arranged and operating in the manner substantially as herein described for the purposes set forth.

63,774.—EGG BEATER.—William Wickersham, Boston, Mass.

I claim the device in egg beaters of giving the segment gear and consequently the beater knives, c c c c, a vibrating motion by means of a crank and connection rod frame, and arranged as described.

63,775.—SCAFFOLD.—John P. Wright, Canton, Minn.

First, I claim the arrangement of the post, P P, with the platforms, o, in combination with the screw shaft, E, substantially as described.

Second, I also claim the shaft, L, and bevel wheel, M, in combination with the shaft, E, and nuts, N N, substantially as and for the purposes set forth.

63,776.—BOOK-HOLDER FOR PEWS.—N. A. Wright, Prairie du Chien, Wis.

I claim the spring holder, C, when adjustable through the slot, a, in the socket, H, to regulate the tension of the spring, when combined and arranged as and for the purpose specified.

63,777.—BURNING FLUID.—I. B. Wiggin, Washington, D. C.

I claim the incorporation of microcosmic salt with the above-named compound of hydrocarbons, reference being had to the use of denser materials both in the composition of the hydrocarbons and the microcosmic salt, so as to make a fluid that can be burned in any kind of lamp, without smoke, bad odor, or danger of explosion.

63,778.—CORSET.—Edward Drucker, Paris, France.

I claim a corset or other similar article made of two or more sections united by seams running in a transverse curvilinear direction, or nearly so, instead of in a vertical direction as usual, substantially as and for the purpose set forth.

RE-ISSUES.

2,543.—SHOE PAD FOR HORSES' FEET.—Samuel Adlam, Jr., Charlestown, Mass., assignee by mesne assignments of John Haseltire. Patented July 25, 1865.

I claim a cushion or protector for horses' feet, made of rubber or rubber compound, and to fit the foot substantially as set forth.

2,544.—MODE OF LUBRICATING THE BEARINGS OF SPINNING FRAMES.—Albert H. Gilman, Milford, Mass., assignee by mesne assignments of himself. Patented June 14, 1864.

I claim a spindle step cap combined or to be connected with the spindle so as to revolve with it and made so as to extend over and embrace or go around the spindle step, and so applied to the spindle as to be capable of being moved lengthwise thereon and fastened in place thereon by a clamp screw or its equivalent, the whole being substantially as and for the purpose or purposes as explained.

I also claim a spindle gear made so as to be movable lengthwise on its spindle and provided with a screw or its equivalent to fasten it in place thereon, and so constructed that the gear itself shall form a cap for and pass down over or around the step without being in contact with it, substantially in the manner and for the purpose shown and specified.

I also claim the combination and arrangement of the grove, v, with the step, a, and with the cap, G, made so as to extend over and embrace or go around the said step, as specified.

2,545.—PUMP FOR DEEP WELLS.—Robert Cornelius, Philadelphia, Pa. Patented March 13, 1866.

I claim forming an annular chamber around the body of the pump at the top of the stroke and connecting this chamber by a series of openings with the interior of the chamber in such a manner that when the piston rises above the openings the liquid from above will flow into the body of the pump and displace the gas, substantially as described.

2,546.—ORNAMENTING ARTICLES OF GLASS OR OTHER VITREOUS MATERIALS.—Anton Schwitter, New York City. Patented Sept. 27, 1864.

First, I claim giving to the tool or cutter used in ornamenting articles of glass or other vitreous material, a motion toward and from the work by hand at the will of the operator, while the work is secured to a movable spindle or carriage, in contradistinction to the ordinary process of cutting glass, in which the work is held in the hands of the operator and pressed against the cutter, which revolves in stationary bearings, substantially in the manner and for the purpose set forth.

Second, The use of the rotary tool in combination with the spindle of an ordinary rose engine or engine turning machine, either with a circular or with an up and down motion, substantially as and for the purpose described.

Third, The adjustable head, d, and swivel head, g, in combination with the extension spindle, I, carrying the tool, H, all constructed and operating substantially as and for the purpose set forth.

Fourth, The slotted plate, J, carrying the bearing for the tool spindle, I, and arranged in combination with the slotted table, A, in the manner and for the purpose substantially as described.

Fifth, The swinging shaft, K, arranged in combination with the adjustable tool spindle, I, in the manner and for the purpose substantially as set forth.

2,547.—WRINGING MACHINE ROLLER.—The Bailey Washing and Wringing Machine Company, Woonsocket, R. I., assignees by mesne assignments of S. A. Bailey. Patented April 29, 1862.

We claim in elastic cylinders of wringing machines the shaft, A, in combination with the rods, ribs, or bars, C, substantially as and for the purpose set forth.

2,548.—TIE FOR COTTON BALES.—G. N. Beard, St. Louis, Mo. Patented July 16, 1861.

First, I claim the shape and proportion of the cleat device, A, with respect to the loop holes, B, substantially as herein set forth.

Second, The fixed combination of a double-hooked cleat having prongs or engaging points of unequal length, with one end of a metallic band having an elongated aperture in its other end, when the length of said aperture is less than the united diameter of the shank of said cleat and length of its longer prong, all substantially in the manner and for the purpose herein set forth.

2,549.—REVERBERATORY AND OTHER METALLURGIC FURNACES.—John R. Grout, Detroit, Mich. Patented July 24, 1866.

First, I claim in a reverberatory or other furnace for treating metals having a bridge wall, or its equivalent, and a combustion or melting chamber, the atmospheric passage way, a a' a'', through the bridge wall so constructed that a thin and broad current or currents of atmospheric air heated in passing through the wall shall be discharged at or near the top of the bridge wall and in rear of the same diagonally across the course of the currents of the gaseous products of combustion on entering the combustion or melting chamber after passing from the fire room.

Second, In such a furnace the atmospheric passage way, b b' b'', through the arch over the fire room and bridge wall so constructed that a broad and thin current or currents of atmospheric air heated in passing through the wall shall be discharged at a line over or nearly over the rear side of the bridge wall downwardly and diagonally across the course of the current of the gaseous products of combustion on entering the combustion or melting chamber after passing from the fire room.

Third, In such a furnace the combination of an atmospheric air passage way constructed through the bridge wall with a similar passage way through the arch over the same, said passage ways being respectively constructed substantially as described.

Fourth, The passage ways, a a' a'', or b b' b'', when constructed respectively in the bridge wall and arch and subdivided in such manner as to discharge the hot air as set forth through two or more orifices with narrow openings, the series extending across or nearly across the entire width of the passage over the bridge wall.

Fifth, The atmospheric passage ways, a a' a'', and b b' b'', constructed so that the air will be heated in passing through the furnace walls when so arranged with valves or other throttles that the flow of air through them may be regulated at discretion, substantially as set forth.

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Sixth, The bridge, c, across the bridge wall above the valve for the protection of the same, substantially as described.

Seventh, So constructing such a furnace that the heat absorbed by the furnace walls may be taken up by currents of air passing through passage ways constructed in the furnace walls which air flowing through them is afterward discharged into and mingled with the gaseous products of combustion after the same have risen from the fuel upon the grates and passed out of the fire room, substantially as described.

2,550.—Pegging Machine.—Alfred B. Ely, Newton, Mass., assignee by mesne assignments of Luther Hall. Patented March 8, 1864.

First, I claim so constructing the awl as to use it as a peg driver.

Second, Interrupting the motion of the awl and employing it as a driver on each alternate downward stroke.

Third, Interrupting the upward motion of the driver on every alternate ascent to prevent the feeding of the peg strip until the hole is made to receive the peg.

Fourth, The boss, I, in combination with the block, G, and switch, d, or their equivalents, substantially as and for the purpose set forth.

2,551.—Auger.—A. C. Kasson, Milwaukee, Wis., and N. C. Gridley, St. Louis, Mo., assignees of A. C. Kasson. Patented January 15, 1867.

First, We claim an auger having a twist whose front or working faces are concave and whose rear surfaces are convex, substantially as represented in Fig. 2.

Second, An auger constructed substantially as herein shown and described which permits the formation of cutting lips at any point in its length by simply cutting off the twist at any given point in a plane coincident or nearly so with the axis of the auger and sharpening its edges

Third, In an auger constructed as described we claim the cutting lips, B, formed with sharpened edges following the concavity of the twist from the screw or center point to the periphery and inclined to the axis of the auger substantially as shown and described.

Fourth, The combination of the twist, the cutting lips, and the cutting edges of the twist, substantially as herein shown and described.

2,552.—Method of Increasing Traction in Locomotives. C. W. Theodore Krausch, Philadelphia, Pa. Patented January 29, 1867.

First, I claim the means substantially as herein described of increasing adhesion of driving wheels of locomotive engines or other draft carriages upon their rails or upon the ground consisting in transfering a portion of the weight of the load to be moved to the said draft carriage by the act of starting this carriage, substantially as described.

Second, The employment of steam or other power in conjunction with a coupling lever, S, or its equivalent, for the purpose of enabling the engineer to increase or diminish the weight upon the frame of the draft caariage at pleasure, substantially as described.

2,553.—Brick Machine.—Egbert C. Bradford, James H. Renick and Obadiah A. Clough, New York City, assignees of Henry Martin. Patented June 27, 1865.

First, I claim the mixing box, A, and press box. C, with its grate, e e, in combination substantially as described with each other and with the gate, j, operating to close the press box against any admission of clay while the molds are being filled, as set forth.

Second, The manner of regulating the rise and fall of the plunger, h, by means of the adjustable tapering slide or gage, i4, on the slotted lever, i2, in combination with the pins, i3, on the toothed segment or wheel, i, substantially as set forth.

Third, The manner of working the plunger, d, in the press box, c, by means of the crank, F, with its wrist, the slotted lever, i2, with its adjustable tapering slide or gage, i4, the toothed segment or wheel, i, with its pins, i3, and the rack, h, attached to the plunger, all combined and operating substantially as and for the purpose specified.

Fourth, The cog wheel, l, and slotted lever, l2, operated by the wrist of the crank, F, in combination with the rack, k, attached to the gate, j, substantially as and for the purpose set forth.

Fifth, The devices for operating the molds under the press box, c, consisting of the lever, P, rock shaft, e, arms, F, connecting links, g, and pusher, E, all combined and operating substantially as and for the purpose specified.

Sixth, The gate, m, raised and lowered by the lever, n, or its equivalent, in combination with the press box, c, for the purpose described.

2,554.—Cotton-bale Tie.—Joseph W. Branch and Joseph Crookes, St. Louis, Mo., assignees of John F. Milligan. Patented Nov. 6, 1866.

First, We claim the application of the buckle, B, for the joining of the ends, A and A', of a hoop or band, when the said ends, or either of them, are passed through a mortise, c, of said buckle, without cutting or otherwise weakening the ends or end so passed, and when the parts thus joined are held by the expansive forces of the compressed bale, substantially as herein fully set forth.

Second, The buckle or tie plate, B, provided with a projection, b, when combined with an oblique slot, c, to receive and secure the ends of the bale hoop, substantially as and for the purpose herein set forth.

2,555.—Lantern.—J. H. Miltimore, Chicago, Ill. Patented August 8, 1865.

First, I claim the upper portion of the base, B, when so constructed as to admit of the passage of an adjustable globe through it and made a part of the guard, and also connected with the lower or flanged portion by a hinge and spring, substantially as shown.

Second, The combination of the lower portion of the base, B, which supports the lamp, with the upper vertical portion which forms a part of the guard in a lantern having the globe removable through such upper portion of the base, substantially as specified.

Third. The disk or ring, D, provided with the lugs, e, in combination with the projections, o, of the base, B, arranged and operating as and for the purposes set forth.

Fourth, I claim the band, F, provided with the inclines, l, in combination with the rod, u, substantially as and for the purposes set forth.

Fifth, I claim securing the lamp by means of the bar or strip, f, and arms, g, when arranged to operate substantially as described.

2,556.—Mode of Finishing Soles of Boots and Shoes.—James Purinton, Jr., Lynn, Mass. Patented January 26, 1864.

I claim, as a new article of manufacture, a boot or shoe having a finish imparted to the heel or sole, by covering the outer surface of the same, in whole or in part, by paper or other material, substantially as set forth.

2,557.—Lantern.—A. B. Ely, Newton, Mass., assignee by mesne assignments of Sumner Sargent. Patented Sept. 17, 1861. Reissued January 23, 1866.

First, I claim constructing the lantern with an aperture or opening in the case through which the wick regulator extends so as to be reached and operated on the outside, when used in combination with such wick regulator, substantially as described.

Second, In combination with the above an opening and closing plate, or its equivalent, for covering and uncovering the opening in the case, substantially as described.

Third, The arrangement of the perforations, i i, in the base flange of the lamp, the draught collector, u, and guard cylinder, R, or any two of them, in combination substantially as and for the purposes described.

DESIGNS.

2,611.—Cook's Stove.—J. Martino, J. Beesley, and J. Currie (assignors to Smith, Wells and Co.), Philadelphia, Pa.

2,612.—Plates of a Cook's Stove.—J. R. Rose and E. S. Calely (assignors to Cox, Whiteman & Cox), Philadelphia, Pa. Antedated March 12, 1867.

2,613.—Bottle.—Charles Gautier, Washington, D. C.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

530.—Fastening for Driving and Other Belts or Bands.—John A. Greene, Brooklyn, N. Y. Feb. 26, 1867.

550.—Screw and Bolt.—Wm. G. Angell, Providence, R. I. Feb. 27, 1867.

561.—Brake for Sewing Machines.—John A. Minor and Robert Bowman, Middletown, Conn. Feb. 28, 1867.

569.—Apparatus to be Used as Spinal, Abdominal, and Pelvic Truss Supports.—Edmund P. Banning, New York City. Feb. 28, 1867.

571.—Steam and Gas Engine.—Chas. E. Emery, Brooklyn, N. Y. Feb. 28, 1867.

599.—Breech-loading Fire-arm.—Benj. S. Roberts, Major-General U. S. Army. March 4, 1867.

619.—Repeating Breech-loading Fire-arm.—Valentine Fogerty, Boston, Mass. March 5, 1867.

621.—Steam Engine and Pump.—Hart F. Pease, Brooklyn, N. Y. March 6, 1867.

629.—Means for Producing Optical Illusions.—Milton Bradley, Springfield, Mass. March 6, 1867.

630.—Coupling for Baling Bands.—Geo. N. Beard, St. Louis, Mo. March 6, 1867.

632.—Insulator for Telegraph Wires.—David Brooks, Philadelphia, Pa. March 7, 1867.

642.—Manufacture of Porcelain.—Waldron J. Cheyney, Philadelphia, Pa. March 7, 1867.

644.—Steam Hammer.—Wm. Sellers and Coleman Sellers, Philadelphia, Pa. March 7, 1867.

646.—Actuating Fan Blowers by Steam Power.—Geo. W. Lemley, Paterson, N. J. March 7, 1867.

652.—Reducing and Refining Metallic Ores and Converting Iron into Steel, and Apparatus to be Used in Connection Therewith.—Silas C. Salsbury, New York City. March 7, 1867.

670.—Apparatus for Starting Street or Horse Railroad Carriages.—Samuel Ward, New York City. March 8, 1867.

798.—Breech-loading Fire-arm.—Edward L. Sturtevant, Boston, Mass. March 19, 1867.

In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions,—smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, $16. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is $25, for the simplest cases, up to $35, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, $20 more is paid the Government, making a total of $61 for the simplest case.

The model should be neatly made of any suitable materials, strongly fastened, without glue, varnished or painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

New medicines or medical compounds, and useful mixtures of all kinds, are patentable.

When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

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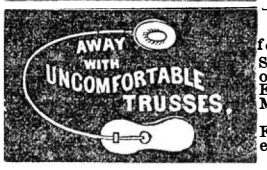

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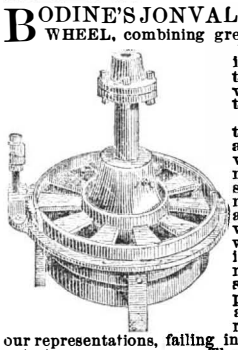

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Their reputation for a full assortment, superior quality, and all the new inventions, will be fully sustained. Orders promptly filled. 13 6eow

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HYDRAULIC JACKS and HYDRAULIC Punches manufactured by E. LYON, 470 Grand street. Send for a Circular. 1 13* eow

WOODWORTH PLANERS—IRON Frames 18 to 24 inches wide. $125 to $150. H. F. Bacheller, Sterling, Ill., says:—"The planer gives perfect satisfaction. I am surprised that so perfect a machine can be sold at that price." Address
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FOR SALE.—The most complete set of Machinery in the United States for the manufacture of Wood, Pocket, and Dressing Combs. There are no goods of this kind in the market, and there is great call for them.
The parties owning the machinery being engaged in other business is the reason for selling the machinery. Enquire at 92 Church street, N. Y., or at the Carpetbag Factory, Middletown, Orange County, N. Y.
Also, Button-mold Machinery, unequaled by any others; there is great call for these goods, also.
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A MACHINE SHOP IN A VERY DEsirable and central location in the city of Chicago, doing a good business, with a steady growing demand for its manufacture, is offered for sale; capital required from $20,000 to $30,000. For further particulars and reasons selling, address Post Office Box 1,129, Chicago, Ill. 14 4*

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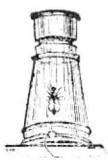

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ANDREWS'S PATENT PUMPS, ENGINES, etc.—CENTRIFUGAL PUMPS, from 90 Gals. to 40,000 Gals. per minute, capacity.
OSCILLATING ENGINES (Double and Single), from 3 to 250 horse-power.
TUBULAR BOILERS, from 2 to 50 horse-power, consume all smoke.
STEAM HOISTERS to raise from ½ to 6 tuns.
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FIRST-CLASS MACHINISTS' TOOLS. PRATT, WHITNEY & CO., Flower street, Hartford, Conn., Manufacturers of Engine Lathes, (15) fifteen inches to (8) eight ft. swing; Power Planers, (16) sixteen inches to (5) five feet wide, and of any length desired, and special machinery. Also only makers of Engine Lathes with Slate's Patent Taper Attachment, conceded by all who have used it to be most perfect and simple in its construction and almost indispensable for good workmanship.
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The great amount of boiler room, fire surface, and cylinder area, which we give to the rated horse-power, make our Engines the most powerful and cheapest in use; and they are adapted to every purpose where power is required.
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We hear there are manufacturers infringing on some one or more of our nine patents in this machine. We caution the public from purchasing such.
All communications must be addressed "Combination Molding and Planing Machine Company, cor. 1st ave. and 24th-st., New York, where all our machines are manufactured, tested before delivery, and warranted.
Send for descriptive pamphlet. Agents solicited. [14 tf

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N. B.—Reliable Orders filled for any part of the world 1 tf

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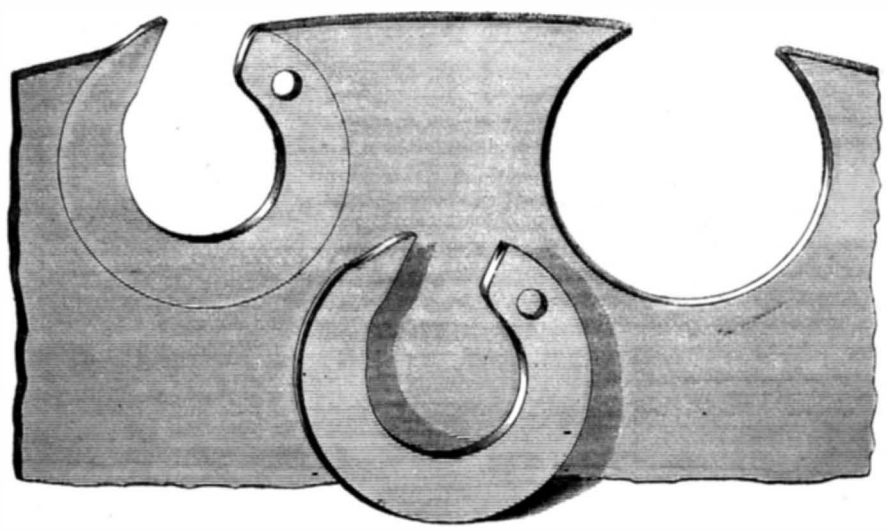
Miller's Adjustable Circular Saw Teeth.

The general use of circular saws gives importance to any device which shall lessen the cost of keeping them in operation and the dangers from accidents by breakage. If a few teeth in a saw, the teeth of which are cut from the plate, are broken or shortened by accident, all the others must be filed to the same radius, thus decreasing the diameter of the saw and unfitting it for the work it was originally intended to accomplish, as well as entailing a large amount of work and requiring much judgment in filing. That this job is no light one may be inferred from a consideration of the fact that a saw thirty inches diameter presents a cutting edge of over seven and a half feet, and to reduce the diameter of the saw only one-eighth necessitates the filing away of a strip of steel one-eighth of an inch wide by the thickness of the plate and about seven feet ten inches long. For these reasons the idea of inserted teeth which could be removed when defective and replaced by others has been a favorite one with mechanics, and saws thus made are now extensively employed.



MILLER'S CIRCULAR SAW TEETH.

The engraving represents a section of a saw plate and two teeth, one in the plate and one detached, which form the subject of a patent issued to W. P. Miller, of San Francisco, Cal., Oct. 9, 1866. The teeth are circular disks with channeled edges, seated in circular recesses cut out of the rim of the saw, the edge of the recess being beveled to a V-shape to correspond with the channel of the tooth. Should one of these teeth be broken at the point it is only necessary to insert a lever or stud in the hole at the heel and turn the tooth forward and file it to an edge. The inventor says that a broken tooth may be removed and another inserted in twenty seconds by any person who has once witnessed the operation. Saws with these insertable teeth cannot easily get out of round or become unbalanced. The friction of the circular bearing surface between the teeth and the plate is sufficient to hold the teeth to their work, and yet if a tooth strikes a bolt of iron it will turn before it breaks. The teeth being perfectly circular may be finished in a lathe and thus duplicated with the utmost precision. The lateral stiffness of the teeth allows a thinner plate, thus saving waste of material. The teeth cannot be thrown from their sockets endangering the workmen.

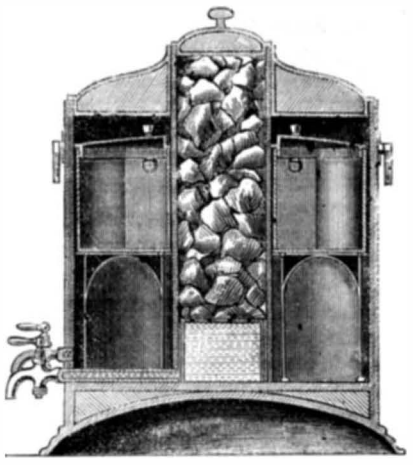
For other particulars address the patentee at 85 Liberty street, N. Y. or Henry Disston, Nos. 67 and 69 Laurel street, Philadelphia.

Mr. Miller has obtained patents through this office in the following countries, England, France, Belgium, Prussia, Russia, Spain, Cuba, Italy, and Austria, and will leave for Europe in a few weeks to introduce his invention abroad. His success in introducing his invention here has been very great.

ELDER'S COMBINED MILK COOLER AND BUTTER PRESERVER.

An ordinary refrigerator takes up room, is costly, and should be kept in a cool place. It is evident that one which occupies less space and can be located in the dining or living room or in a pantry, would save many steps and much trouble otherwise. The engraving is a section of a water-cooler and a refrigerator which is ornamental in its exterior and perfect in its operation.

Externally it resembles the ordinary water cooler, being made in a cylindrical form, of tin or galvanized iron. It is made of any required size, from that of a water cooler to a capacity sufficient for the wants of a hotel. Between the outer case and the inner is interposed some non-conducting material which will keep the coolness in and the warmth out. In the center is a cylinder for the reception of the ice.



This has a lid separate from that of the refrigerator, and near the bottom has a filter under which is a water receptacle for holding the product of the melted ice, which can be drawn off in the form of pure ice cold water by the lower cock, for drinking purposes. Surrounding the central ice chamber are movable cans for milk and receptacles for butter, meats, etc. It is a *multum in parvo* convenient, useful and beautiful. It received the first premiums at the state fairs of Illinois and Indiana, and is commended by all who have examined it. It is the subject of three patents bearing dates Aug. 22nd, Sept. 4th, and Dec. 4th 1866. For state and county rights and for further information address John R. Elder, Indianapolis, Ind.

PATENT CLAIMS.—Persons desiring the claim of any invention, patented within thirty years, can obtain a copy by addressing a note to this office, giving name of patentee and date of patent, when known, and inclosing $1 as a fee for copying. We can also furnish a sketch of any patented machine to accompany the claim, at a reasonable additional cost. Address MUNN & CO. Patent Solicitors, No. 37 Park Row, New York.

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Billiard stock in quantities to suit purchasers always on hand KAVANNAGH & DECKER, 172 Center street, cor. Canal, N. Y., and 601 and 603 Fourth street, cor. Washington avenue, St. Louis, Mo.

AGENTS WANTED.
$200 Per Month and Expenses Paid Male or Female Agents, to introduce a New and Useful Invention, of absolute utility in every household. Agents preferring to work on Commission can earn from $10 to $20 per day. For full particulars, inclose stamp, and address W. G. WILSON & CO., 16 os4*] Cleveland, Ohio.

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WITH
EMERSON'S PATENT MOVABLE TEETH.
These Saws cut More and Better Lumber in the same time, and with Less Power, than any other Saw in the world, with Less Expenditure of Labor and Files to keep in order, and never Wear Smaller. Also,
EMERSON'S PATENT GAUGING AND SHARPENING SWAGE,
For Spreading the Points of Saw Teeth. Send for New Descriptive Pamphlet, with Price List.
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2 Jacob street, near Ferry street, New York. 15 3*

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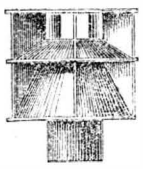
AND CHIMNEY TOP.

SUPERIOR TO ANY HERETOFORE PRODUCED.
Excludes all Dampness and Creates a Powerful Draft.
IT ESTABLISHES A PERFECT VENTILATION,
AND IS A SURE CURE FOR SMOKY CHIMNEYS.
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GENERAL AGENT,
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PROVIDENCE DYEING, BLEACHING, AND CALENDERING CO., Office 20 Sabine street, PROVIDENCE, R. I., April 2, 1867.
JOSEPH A. MILLER, C. E.:
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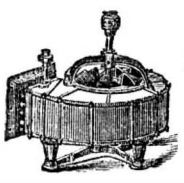
We find a great saving of time and steam in our Drying Department. Formerly our walls would remain wet several hours under the ordinary method of ventilation—now, with your pneumatic system, our walls keep perfectly dry, and one thousand pieces are perfectly dried in four hours less time. Our Dye House is kept perfectly clear, and our Singe House free from stifling smoke. The pneumatic force of the air, as well as the radiation of the sun, are made so available that they work in all weathers and under all circumstances. They are truly worthy the attention and use of manufacturers, and all needing ventilation. We take pleasure in recommending them.
Yours respectfully, RICHARD PARTINGTON, Superintendent.
State, County, or Shop Rights for the Western and Southern States for sale.

TURBINE WATER WHEELS.

The REYNOLDS PATENT embodies the progressive spirit of the age. Simplicity, Economy, Durability, Accessibility all combined. The only Turbine that excels Overshots. Awarded the Gold Medal by American Institute.
Shafting, Gearing and Pulleys furnished for all kinds of Mills, made on Mechanical Principles, under my personal supervision, having had long experience. Circulars sent free.
GEORGE TALLCOT,
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The wheel mentioned below has a working head of 18 feet, and when driving the amount of machinery specified used 34 cubic feet of water per second.
Mr. Watkinson sends us the following
January 1st, 1864, at Union Manufacturing Company's Factory, Conn., 3½ feet, No. 2, Reynolds' Wheel drives the following machinery:—

18 feet head this day:	
3 Lappers, 36-in.; 3 Beaters: 2,000 turns	12 H. P.
4 Mason (self-acting) Mules, 1,952 spindles	5 "
10 Gambrell Patent Cards, 36-in., with workers.. and strippers, 150 turns of main cylinder...	6 "
2 Brown's Slubbers, 86 spindles: flyer 800 turns	2 "
3 " Fine Speeders, 186 spindles; flyer 1,400 turns	2 "
3 Drawing Frames, 5 Doublers, etc	1 "
31 Ring Frames, spin'g; 1,984 spindles, 5,000 turns	15 "
92 Gingham Looms, speed 110	8 "
Shafting	10 "
Total	61 H. P.

(Attest), E. B. WATKINSON, Union Manufacturing Co.
The wheel is one of our substantial iron working wheels, not designed for testing, but such as we build every day for our customers. The useful effect, it will be seen, is over eighty-seven per cent.

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GEO. A. BLANCHARD.] 10 os13* [J. A. McKEAN.

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We are prepared to furnish
FIRST-CLASS MACHINISTS' TOOLS OF EVERY DESCRIPTION, ON SHORT NOTICE AND REASONABLE PRICES.
SAMPLES of the TOOLS manufactured by us may be seen at our Wareroom, and we invite an inspection of their Workmanship and Design by those in want of superior Machinery.
NEW YORK STEAM-ENGINE CO.
Office and Wareroom
7 os 13* 222 Pearl street, New York.

WILD MOSS MILLS, Carrollton, Mo., March 14, 1867.
ALONZO WARREN, Esq., Boston, Mass.:
Dear Sir—The first-class, high finished, hollow shaft, globe coupling Turbine Water Wheel purchased of you last summer has been running three months. Went together like a clock; runs strong and steady: economical in using water; journals work cool; answers all recommendations. I am well pleased—satisfied enough to pay for this unsolicited notice of its merits through the Scientific American. Respectfully yours,
16 3os J. F. LAWTON.

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